This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

B 438144

3 9015 06733 6795

1662

PRESENTED TO
THE LIBRARY
OF THE
University of Michigan.
By O. Judd
18[illegible]2.

33/1

SB
824
.N7
F54

THIRD, FOURTH, AND FIFTH REPORTS

ON THE

NOXIOUS,

BENEFICIAL AND OTHER

INSECTS,

OF THE

STATE OF NEW-YORK.

MADE TO THE STATE AGRICULTURAL SOCIETY, PURSUANT TO AN
ANNUAL APPROPRIATION FOR THIS PURPOSE FROM
THE LEGISLATURE OF THE STATE.

BY ASA FITCH, M. D.,
ENTOMOLOGIST OF THE N. Y. STATE AGRICULTURAL SOCIETY; MEMBER OF THE
ENTOMOLOGICAL SOCIETY OF FRANCE; THE ALBANY INSTITUTE, ETC.

ALBANY:
C. VAN BENTHUYSEN, PRINTER.
No. 407 Broadway.
1859.

Entered according to Act of Congress, October 8th, 1856, in the Clerk's
Office of the Northern District of New York.

THIRD REPORT

ON THE

NOXIOUS AND OTHER INSECTS

OF THE

STATE OF NEW-YORK.

BY ASA FITCH, M. D.,

ENTOMOLOGIST OF THE NEW-YORK STATE AGRICULTURAL SOCIETY.

Copy-right secured to the Author.

Executive Committee New York State Agricultural Society:

In presenting this, my third Report, I would observe that the researches in which, pursuant to your instructions, I am occupied, embrace a field of vast extent. These researches, for the present, have a particular reference to those insects which are injurious—the branch of science which is termed Economical Entomology. They thus include a consideration of all those insects which are detrimental,

1. To fruit trees.
2. To forest trees.
3. To the grass crop of meadows and pastures.
4. To grain and other field crops.
5. To the kitchen garden.
6. To the flower garden and greenhouse.
7. To domestic animals.
8. To man, molesting (1.) his person, (2) his household property, such as furniture, clothing, stored provisions, &c.

These several heads will, I belive, embrace every object which legitimately pertains to this branch of science; and this, in my apprehension, is the most simple and appropriate division, the best classification of its objects which can be made. And when we call to mind how many insect depredators are to be found upon a particular kind of tree, or a single one of our grain crops, it will at once be perceived that the number of objects to be examined under all of the several heads above specified, will be truly immense. Many years will of course be required to investigate each one of these sufficiently to render such a full and exact account of it as the advanced state of knowledge at the present day demands—an account which will give the reader a complete view of the history and economy of each species—such an acquaintance with them, in short, as is requisite to enable those who are suffering from these pests to devise the most suitable and effectual modes for combatting them.

In the meantime, as the habits of a multitude of these depredators have already been investigated more or less fully by different observers, it is important that the information relating to them, which is now scattered through a number of different works, many of which are inaccessible to those who are most deeply interested in the premises, should be brought together in a condensed form, so as to present a full view of this subject. More than a century ago, the celebrated naturalist Reaumur, expressed the wish that those observers who are laboring to elucidate the history of insects, would prepare and give to the world lists of all the kinds which feed upon each particular tree and plant. But in this country, where so little accurate knowledge of our insects is diffused among the population, in addition to its name, an indication of the external appearance and habits of each species is a great desideratum. Our agricultural periodicals are making frequent allusion to this as a most important want at the present time. And I have hence thought that, in addition to the original matter which I have to report as the fruit of my own investigations, I could not render a more valuable service than that of posting up this subject in such a manner as to present a map as it were of the entire field. I therefore propose, in this and the succeeding reports, to pass over this whole ground, giving every American insect which is at present known as being an injurious species, arranging them in their regular order under the several heads above specified. I design to give the common and the scientific name of each species, with the name of the order and family to which it pertains, followed by a brief statement of (1st) the particular injury which each species does and the time of the year when it commits its depredations, (2d,) the appearance of the depredator, and if it be a worm or larva, add to this (3d) where it secretes itself to repose during its pupa state, and (4th) the appearance which it finally assumes when it comes out in its perfect form; and if it be a species the history of which has already been published, give (lastly,) a reference to the work where the most particular account of it and the remedies for opposing it will be found. I endeavor in each instance to render this account as succinct as possible, at the same time sufficiently plain and definite to enable any one, when he meets with an injurious insect, to ascertain its name. As it is the leading design of these Reports to impart information to common readers, I aim to use such terms and give such comparisons as will make the subject most clear to their comprehension, even at the risk in some instances of appearing inelegant and uncouth.

Many insects, it is well known, feed upon several different kinds of vegetation. The account of these is introduced under the particular tree or plant to which each appears to be most attached and on which it occurs in the greatest abundance, and under each of the other trees or plants on which it is known to feed, its name only is given, with a reference to the place where the description of it will be found, the species being numbered in a continuous series to facilitate such references. A large portion of the insects which now infest our fruit trees, originally subsisted upon the native forest trees of this country, and many of these still occur in their original haunts in greater numbers than in the new situations to which circumstances have obliged them to resort. But as such insects will be much more frequently noticed upon fruit trees, and are more important to us in consequence of the depredations they are liable to commit upon the trees of this class, I place the description of them under this head. The present Report thus completes the account of all the insects at present known to infest our fruit trees, both cultivated and wild, the latter embracing the chestnut, hickory, butternut and hazlenut, which I class as fruit rather than forest trees, for the reason that they are more valued through our country generally, in consequence of the fruit which they yield, than for the timber and fuel which we obtain from them.

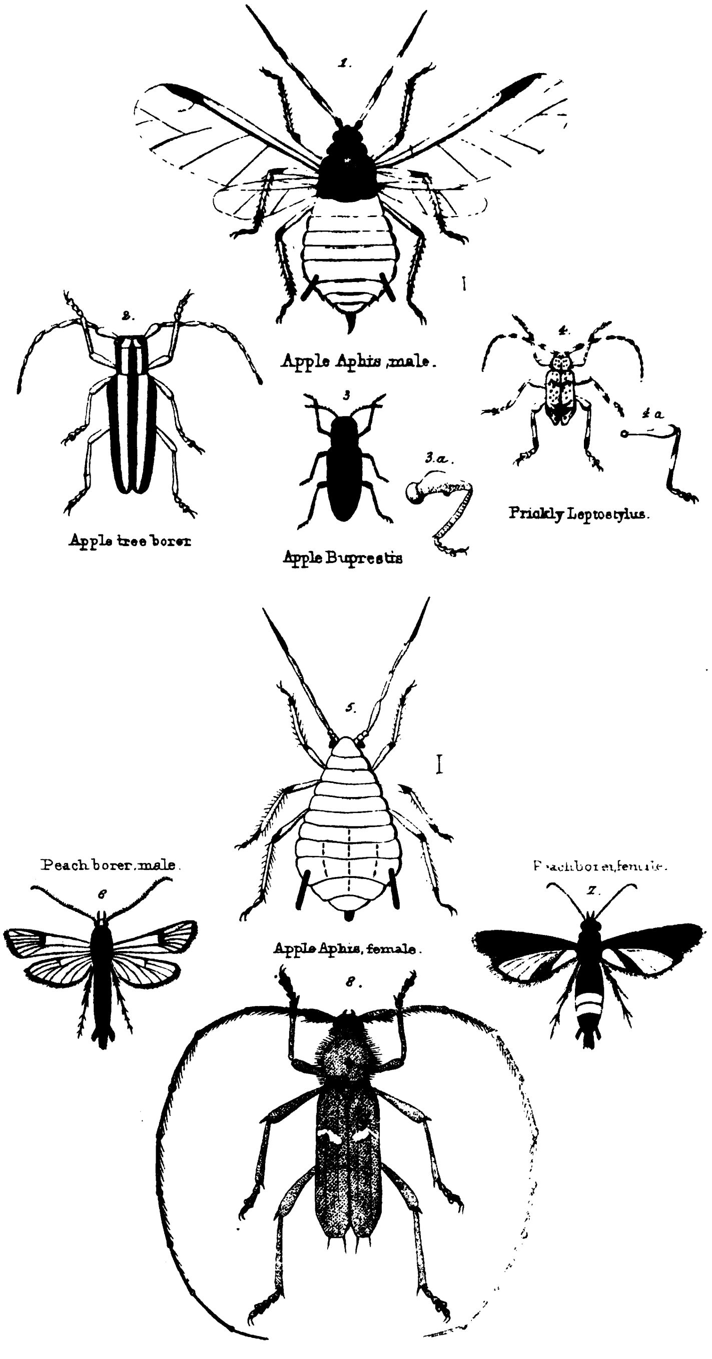
Many things which are most interesting and remarkable are brought to my view, in the researches in which I am occupied, and I sometimes think there is no kind of mischief going on in the world of nature around us but that some insect is at the bottom of it. Certain it is that these little creatures, seemingly so insignificant and powerless as to be unworthy of a moment's notice from any body but the curious, occupy a most important rank in the scale of creation, and on every side of us their performances are producing most important results, tending probably in an equal degree to our benefit in one direction as to our detriment in another. We are accustomed to read with wonder the accounts which authors give of the singular habits and amazing achievements of these creatures in foreign lands, little suspecting that in the fields and woods around our own dwellings, operations are constantly going on which are every whit as interesting and marvellous. Since my last Report was presented, I have succeeded in completing the history of an insect whose deeds are as astonishing as anything on record in the annals of science. It is well known that certain insects have been created apparently for the sole purpose of preying upon other insects, and thus restraining them from becoming excessively multiplied. But I am not aware of any discovery hitherto made indicating it to be the office of any creature of this class to check the undue increase of any of the higher orders of animals. The fact has long been known of the squirrels of this country that the males are very frequently emasculated, but how this deformity is produced has all along been involved in doubt, it being the current popular supposition that some of these animals seize and overpower their unfortunate fellows and with their sharp teeth reduce them to the condition of eunuchs. But I am now prepared to report a fact which will probably set this mooted point to rest. I find we have a species of fly, analogous to the bot fly of the horse and the gad fly which produces the warbles in the backs of cattle, the grub of which resides in the scrotum of the squirrel and consumes its testicles. How surprising that an insect should have been called into existence for the express purpose of executing such a singular work as this!

And in connection with the investigations which I am pursuing other facts similarly valuable as shedding additional light upon this branch of the natural history of our country are frequently elicited, which, however, have no relation to the subject of noxious insects. I have therefore appended a few supplementary pages to the present report, in which the more important items of this extraneous matter is presented.

Respectfully submitted,

ASA FITCH.

PLATE 1



Apple Aphis, male.

Apple tree borer

Apple Buprestis

Prickly Leptostylus.

Peach borer, male.

Apple Aphis, female.

Peach borer, female.

Belted long horn

[illegible] Lith. of C. Van Benthuysen, Albany

INSECTS INFESTING FRUIT TREES.

THE APPLE.—*Pyrus Malus.*

AFFECTING THE ROOT.

1. APPLEROOT BLIGHT, *Pemphigus Pyri*, Fitch. (Homoptera. Aphidæ.)

Wart-like excrescences growing upon the roots, sometimes of an enormous size; containing in their crevices exceedingly minute pale yellow lice, often accompanied with larger winged ones, having their bodies covered with a white cotton-like matter.

The mature, winged insect, a black fly with a dull greenish abdomen and the wings transparent but not clear and glass-like, with a faint smokiness at their tips, in the cell or space inclosed by the last of the four oblique veins. Length to the end of the wings nearly or quite a quarter of an inch, (0.25.) See Transactions of the New-York State Agricultural Society, 1854, page 709.

AFFECTING THE TRUNK.

Worms beneath the bark, mining cavities in the outer sap wood and boring holes in the heart wood.

These are the most pernicious enemies which the apple tree has, whole orchards of young trees, if neglected, being almost sure, of late years, to become suddenly infested and destroyed by one or more of these insects.

2. APPLE TREE BORER, *Saperda bivittata*, Say. (Coleoptera. Cerambycidæ.)
[Plate I, fig. 2.]

A large cylindrical white footless grub, rather broadest anteriorly, its head chestnut brown, its mouth black. Excavating irregular roundish or long and narrowish flat shallow burrows, immediately under the bark, at the crown of the root, where the worm lies through the first winter; then boring upwards in the solid wood about three inches, and reposing here through the second winter, the perfect insect coming out of the tree the following June.

A cylindrical butternut-brown beetle, hoary white beneath, and with two broad milk white stripes above, running the whole length of its body. Length 0.60 to 0.75.

A full account of this species will be found in my first report, Transactions N. Y. State Agricultural Society for 1854, p. 715. Having recently enjoyed ample opportunities for inspecting the work of this borer, I find it is more variable in its habits than previous information had led me to suppose. The account given by Dr. Harris, the best authority we have hitherto possessed on subjects of this kind, has caused a very imperfect and in some respects erroneous idea of its operations to become widely prevalent in our country. He says, " The grub, with its strong jaws, cuts a cylindrical passage through the bark, and pushes its castings backwards out of the hole from time to time, while it bores upwards in the wood, penetrating eight or ten inches in the tree." But, as I have heretofore stated, it is when the worm first hatches from the egg that it mines its way through the bark, and is then so minute that the hole it makes is no larger than the perforation of a pin, and often becomes wholly closed and obliterated. And the worm does not now penetrate into the wood, but feeds upon the inner layers of the bark and the outer layers of the sap-wood, for about a twelvemonth, and till it is half grown to maturity, excavating hereby a shallow flat cavity between the bark and the wood, which cavity extends some two or three inches up and down and is half as broad, but is commonly very irregular in its form, in consequence of several worms working in the same tree and avoiding any encroachment upon each other. This cavity is almost invariably found stuffed full and densely packed with the sawdust-like castings or chips of the worm, a small quantity of which is commonly protruded to the outside of the bark, sometimes through a natural crack formed by the bark becoming dead, dry and contracted, sometimes through one or more small orifices which appear to be gnawed by the worm. But I have met with many instances where none of this powder was protruded, the blackened and slightly depressed surface of the bark being the only indication of the mischief that was going on beneath. And not unfrequently the worm eats downwards, under the bark of the root, to a distance of two to four inches below the surface of the ground, instead of being always at or slightly above the surface, as previous accounts have implied. And it is of course impossible for any castings to be protruded from this part of its burrow, as the soil is firmly pressed against and moulded to the root. And where this powder appears externally, it commonly has the aspect not of having been thrust out by the worm, but of having crowded itself out, from the mass under the bark swelling by being dampened by rain soaking through the dead bark and saturating it.

The worm is almost always found at some part of the outer edge of its burrow, where it is lying apparently dormant, crowded and tightly wedged between the bark and the wood. Like most other larvæ, this moults, and its cast skin will sometimes be found among the dust in the burrow. At length, in the course of the second summer, when it has grown to half or three-quarters of an inch in length and its jaws have become sufficiently strong for the work, it begins to bore a cylindrical passage upward in the solid wood, making hereby a secure retreat, in the interior of the tree, in which to lie and sleep during its pupa state. It is not till just the close of the larva period of its life that it completes this cylindrical burrow by extending it onwards and obliquely outwards to the bark. It then stuffs the upper end of this passage with sawdust-like powder, and its lower end with short fibres of wood arranged like curly locks of hair, thus forming an elastic bed on which to repose during its pupa state. After it has changed from its pupa to its perfect form, it still remains dormant and motionless in its cell, sometimes for several weeks. Awaking at length to life and activity, it crawls upward, loosening and pulling down the dust and chips from the upper end of its burrow, till it reaches the bark. Through this it cuts a remarkably smooth round hole, of the exact size requisite to enable it to crawl out from the tree. This hole is commonly only four or six inches above the surface of the ground. And sometimes a worm will be met with boring its cylindrical burrow in the wood of the root, in a situation where it is evident it intends to pass its pupa state under the ground and emerge below or at the surface.

Although this borer is a native insect which has always existed upon this continent, it appears to be recently that it has taken up its residence in the apple tree. Aged persons inform me that no insect except the caterpillar was formerly known to infest this tree; and it is quite certain that our predecessors, fifty and a hundred years ago, with the little attention they were accustomed to bestow upon their orchards, could not have had such thrifty, large, long lived trees as we know were common at that time, if this and other insects attacked them then as they do now. We have met with no record, pointing this out as a depredator, until the year 1824, when Mr. Say, describing this species, notes that "In the larva state it is very injurious to the apple tree, boring into the wood." And the following spring its character appears to have become known in the vicinity of Albany for the first time. The reminiscence is one of too much interest in the history of this insect to be permitted to pass into oblivion. April 27th, 1825, the late Philip Heartt of Troy, in a letter to Jesse Buel, states that an orchard of young trees which he would not have parted with for two thousand dollars, he had just discovered were all girdled and destroyed, or very nearly so, by worms under the bark, of all sizes, from that of a large yellow grub, downward. Some of these insects at that early season were found in their perfect state, from which Dr. James Eights, Jr. ascertained them to be the species which Mr. Say had recently named and described. Judge Buel hereupon wrote to Mr. Say, soliciting further information and a remedy, who replied, recommending a measure which had then lately been found successful against the peach root borer, namely, placing common mortar around the root of the tree. This correspondence is published in full in the Memoirs of the New-York Board of Agriculture, vol. iii, commencing on page 478; and from it some facts may be gathered respecting the habits of this insect, which have not been stated in any of the accounts since published.

Remedies.—To repel the beetle from depositing its eggs upon the bark, the tree should be rubbed with soft soap or some other alkaline preparation, the latter part of May. Although the insect has been found changed from its pupa to its perfect form in April, I suppose such individuals would remain dormant in their cells until the season became more advanced and warm; and we have no knowledge of its appearing abroad until the beginning of June. We are yet in want of exact observations as to the date of its depositing its eggs. If preventive measures have been neglected and these worms have established themselves at the root of the tree, they should immediately be ferreted out and destroyed. This can be done much more easily when they are young and small, as they are then lying directly under the bark. Young trees should therefore be inspected every autumn or early in the spring; and if any particles of powder, like new sawdust, are found upon the ground around the root, the dead blackish bark at that point, and at other places where such bark occurs, should be cut away, until the worm beneath is discovered. A little experience will render one expert in detecting the lurking places of these pests. And they should never be allowed to remain until the second summer, to finish their injury by boring in the solid wood of the tree.

3. Apple Buprestis, *Chrysobothris femorata*, Fabricius. (Coleoptera Buprestidæ.) [Plate I, fig 3.]

A pale yellow footless grub, its anterior end enormously large, round and flattened. Excavating a cavity under the bark and in the solid wood analogous to that of the preceding species, but much smaller.

The insect a flattish oblong, shining black beetle, its under side appearing like burnished copper, its wing covers with three raised lines, the outer two interrupted by two impressed spots. Length 0.50. Basking in the sunshine, upon apple trees, in June and July. See Trans. N. Y. State Agricultural Society, 1854, p. 729.

APPLE. TRUNK.

4. PRICKLY LEPTOSTYLUS, *Leptostylus aculiferus*, Say. (Coleoptera. Cerambycidæ.) [Plate I, fig. 4.]

Small worms, similar in appearance to young apple tree borers, occurring sometimes in multitudes under the bark, forming long, narrow winding tracks upon the outer surface of the wood, these tracks becoming broader as the worm has increased in size.

A rather short and thick brownish gray beetle, with small prickle-like points upon its wing covers, and back of their middle a white curved or V-shaped band, with a black streak on its hind edge. Length, 0.35. Appearing the last of August. See Country Gentleman, vol. ix, p. 78.

The wood of the apple tree was formerly highly valued for cabinet work in this country. In 1786, a son of Gen. Israel Putnam, residing in Williamstown, Mass., had a table made from one of his apple trees. Many years afterwards the gnawing of an insect was heard in one of the leaves of this table, which noise continued for a year or two, when a large long-horned beetle made its exit therefrom. Subsequently the same noise was heard again, and another insect, and afterwards a third, all of the same kind, issued from this table leaf—the first one coming out twenty and the last one twenty-eight years after the tree was cut down. These facts are more fully stated in the history of the county of Berkshire, published at Pittsfield, 1829, page 39. This, I believe, is the longest period of an insect remaining alive in timber, of which we have any record, and it is important to ascertain, if possible, what insect this was. John J. Putnam, Esq., of Whitecreek, N. Y., was a young man, residing at his father's in Williamstown, when these remarkable incidents occurred. On showing to him specimens of all the larger long-horned beetles of this vicinity, he points to the *Ceraspherus balteatus* (plate 1, fig. 8; see insects infesting the trunk of the hickory,) as being the same insect, according to the best of his recollection, though he is not certain but it might have been the *Callidium agreste*. This testimony, in connection with what President Fitch of Williams college says of the insect in the notice above referred to, "its color dark glistening brown with tints of yellow," releases us from all doubts upon this subject, as the *agreste* is of a uniform brown color, whilst the *balteatus* commonly presents traces more or less distinct of an oblique yellowish spot or band near the middle of its wing covers. We may therefore regard the *balteatus* as another insect which occasionally bores in the trunks of the apple tree.

5. APPLE BARK BEETLE, *Tomicus Mali*, new sp. (Coleoptera. Scolytidæ.)

Young thrifty trees, soon after putting forth their leaves in spring, suddenly withering, as though scorched by fire, the bark becoming loosened from the wood, and soon after numerous perforations like pin holes appearing, penetrating through the bark and into the wood, from each of which comes out a very small, cylindrical beetle, which is smooth, slender, black, sometimes dark chestnut red, its legs and antennæ testaceous or dull pale yellowish, its thorax anteriorly minutely punctured, the declivity at the tip of the wing-covers less abrupt than usual, with an excavation or groove along the suture, which gives the apex a notched appearance, and near the middle of the declivity upon each side of this groove a slightly elevated tubercle of the shape of a crescent, with its concave side towards the suture. Length 0.09.

I only know this insect from specimens recently sent me from Middlefield, Mass., by Lawrence Smith, Esq., who writes me that he took them July 6th, from the trunk of an apple tree ten inches in diameter, which was numerously punctured from the surface of the ground to where the limbs commenced branching off, above which no traces of them were to be found. In another letter he states that this insect was first noticed in his neighborhood two years ago, when several nursery trees were riddled by them. Nothing was seen of them last year; but they have reappeared the spring of the present year (1857) in greater abundance, and a number of trees have been ruined by them. I find a specimen of this same insect also in a collection sent me several years since from Ohio, by Dr. Robert H. Mack, of Parma.

The joints of the feet and the contour of the antennæ is the same in this insect as in the genus *Tomicus;* but between the second joint of the antennæ and the knob or club is a mere cylindrical pedicel to the knob, scarcely as long as the second joint and less than half its diameter, destitute of articulations cutting it up into small joints. The antennæ are thus but five jointed, the knob being composed of only three nearly equal joints. And I find no genus defined, the antennæ of which strictly coincide with those of this species.

PEAR BLIGHT BEETLE, *Scolytus Pyri.* See Pear insects, No. 56.

Several individuals of this species were also found by Mr. Smith, associated with the foregoing, and coming out from the bark a few days before them, making a perforation twice as large, the holes of that species being but three-hundredths of an inch in diameter, whilst those of this insect measure 0.06. A specimen of the wood sent me, shows a perforation made by this larger insect, running in a straight line through the bark and into the wood three-fourths of an inch, with three lateral galleries of the same size branching off from this at right angles upon one side, and one upon the opposite side, these galleries being excavated up and down parallel with the grain of the wood.

It thus appears that the pear blight beetle, instead of being limited to the twigs in its operations, as has heretofore been supposed, attacks the trunk of the tree also. And it is therefore evident that there are two generations of this insect each year. The new shoots at the ends of the limbs are not sufficiently grown to accommodate the earliest brood, and they are therefore nurtured in the trunk of the tree. When these reach maturity, the newly grown twigs offer them a more dainty repast, and they accordingly resort to them, blighting and destroying them in the manner hereafter stated in the account of this insect, No. 56.

It was formerly supposed that the bark beetles only infested trees which were already dying or dead. But more recent observations have shown that sound healthy trees are attacked and killed by them. And these observations are fully confirmed by Mr. Smith, who states that it is young thrifty apple trees, that made a most vigorous growth last summer, which have been killed this past spring by these insects.

Worms consuming the wood of old and hollow trees, hastening their decay.

The larvæ of quite a number of beetles feed upon the old and decaying wood of almost all our trees, showing little preference for one tree over another. Those only which from their very large size will be liable to attract notice when found as they frequently are in the interior of aged apple trees, may here be specified, although they are equally common in oaks, willows, &c.

6. HORN-BUG, *Lucanus Capreolus*, Linnæus. (Coleoptera. Lucanidæ.)

Large thick nearly cylindrical white worms, with the hind part of their bodies curved downwards and forwards, their heads and six legs tawny reddish, the mouth darker. In the loose dirt which accumulates in the hollow of the tree, forming large hard brown pods, resembling eggs, in which to lie during their pupa state.

The insect, a large oblong beetle, smooth and shining, of a chestnut or mahogany color, the males with stout sickle-shaped jaws as long as the head, and having a small tooth on their inner edge near the middle. Length 1.00 to 1.20. Often flies in at open windows, in warm evenings in July. See Harris's Treatise, p. 40.

7. **Rough Osmoderma**, *Osmoderma scabra*, Beauvois. (Coleoptera Melolonthidæ.)

A worm similar in size and shape to the preceding, but much more rough and wrinkled transversely, changing to a broad oval black beetle, coarsely punctured, flattened upon its wing covers, which are rough from irregular elevations and have impressed lines along the middle; the males smaller, purplish black and slightly coppery, with the head flat and its edges turned upward. Length 0.80 to 1.10. Appears in July. See Harris, p. 37.

8. **Smooth Osmoderma**, *Osmoderma eremicola*, Knoch.

This doubtless has the same form and habits with the preceding though it has not yet been observed in its larva state. The beetle is also similar in size and form, but is perfectly smooth, shining and of a deep mahogany brown color, the males having a broad transverse excavation on the fore part of the thorax. See Harris, p. 38.

9. **Big-eyed snapping beetle**, *Alaus oculatus*, Linnæus. (Coleoptera Elateridæ.)

A smooth flattened tawny yellow worm, dark brown or black at each end, growing to two and a half inches in length by 0.40 in width, rather broadest in the middle, the last segment with two thorn-like points curving upward, and on its under side a large, soft retractile pro-leg, with six small slender legs anteriorly; changing to a long, rather flat black snapping beetle, with its wing covers speckled with white, and on its thorax two large eye-like spots of coal black, surrounded by a white ring. Length 1.00 to 1.80. Occurs in June and July. See Harris, p. 48.

Two other New-York species, very similar to this and doubtless having the same habits, may here be noticed. They are much less common, and are met with in the month of April.

10. Purblind snapping beetle, *Alaus myops*, Fab.

Brown, clouded with ash-gray, the eye-like spots much smaller, dim, and oval instead of round.

11. Blinking snapping beetle, *Alaus luscus*, Fab.

Differs from the foregoing only in being wholly destitute of any gray or white coloring.

The Divaricated Buprestis (see No. 71,) is sometimes met with upon decaying apple trees.

AFFECTING THE LIMBS AND TWIGS.

Mining the twigs internally causing them to perish.

12. Apple twig borer, *Bostrichus bicaudatus*, Say. (Coleoptera Bostrichidæ.)

Particular twigs withering and their leaves turning brown in midsummer, with a hole the size of a knitting needle perforated at one of the buds some six or twelve inches below the tip end of the twig, this hole running into the heart of the twig, which is consumed some inches in length.

The insect, a small cylindrical beetle, dark chesnut brown, black beneath, the fore part of its thorax rough from minute elevated points, and in the males furnished with two little horns, and the tips of their wing covers above, with two prickle-like points which curve inwards. Length 0.25 to 0.35.

This insect occurs from Pennsylvania to Mississippi, and has been common of late years in the orchards of Michigan and Illinois, but has never been met with as yet in New-York or New-England.

The blight beetle destroys the twigs similarly, perforating a minute hole at several of the buds instead of one only, but it is more common on the pear tree. See No. 56.

The oak pruner, represented on plate ii., fig 2, in its larva state severs the small limbs, in summer, cutting them off as smoothly as though the work were done by a saw. It is rare on the apple and so common on the oak that the description of it will be given under the latter.

Wounding the twigs externally, causing them to break and fall.

13. New-York weevil, *Ithycerus Novaboracensis*, Forster. (Coleoptera Attelabidæ.)

A beetle in May and June, eating the buds and gnawing into the twig at their base, cutting it often to the pith.

A gray weevil, the largest one in this country, each of its wing covers with four white lines, which are interrupted by black dots, the thorax with three whitish lines. Length 0.35 to 0.60. See Horticulturist, vol. viii, p. 386.

14. Seventeen-year locust, *Cicada septemdecim*, Linn. (Homeoptera. Cicadidæ.)

Appearing in June, in immense numbers, at intervals of seventeen years; making slits in the small limbs of the trees, in which to deposit its eggs, causing a profuse flow of sap from the wounds, the limb commonly perishing. A very large black fly with red eyes and four large glassy wings, the ribs of which are bright orange yellow. Width across the wings when spread, 2.50 to 3.25. See Trans. N. Y. State Agric. Soc. 1854, p. 742.

This locust will next appear in this State in 1860 along the Hudson river and on Long Island; in 1866 in the west end of the State; and again on Long Island in 1868 and 1872. S. Calverly, Esq., of Brooklyn, assures me that some of these locusts can be met with on Long Island every year.

DOG-DAY CICADA, see No. 72.

Puncturing the smooth bark of the limbs and extracting their juices.

15. Apple bark-louse, *Aspidiotus conchiformis*, Gmelin. (Homoptera. Coccidæ.)

An oblong flattish brown scale, one-eighth of an inch long, shaped like an oyster shell, fixed to the smooth bark and resembling a little blister; sometimes crowded together in such numbers as to wholly cover the bark. Beneath each of these scales from a dozen to a hundred minute white eggs, which hatch the latter part of May, giving out tiny lice, resembling minute white dots or atoms, which disperse themselves over the smooth bark and then become stationary, with their beaks inserted in the bark sucking its juices. Some of these ere many days acquire two wings and resemble small flies or midges. These are the males. The others remain fixed to the bark, die, and become overspread with a substance resembling fine blue mould, forming little patches upon the bark through most of the month of June. As this mouldiness wears off, the little blister-like scale first noticed again becomes visible, these scales being the dried relics of the females, forming a covering to protect their eggs through the autumn and winter. See Trans. N. Y. State Agricultural Soc. 1854, p. 732.

Of late years every orchard in the district adjacent to Lake Michigan has been ruined by this insect. Numerous remedies for abating the evil have been tried, without success. Now at last, it is pretty well ascertained that anointing the trees with grease or oil is an effectual remedy. I am assured of this by Dr. Hoy, of Racine, and other correspondents, and by several communications in the Prairie Farmer and other agricultural periodicals.

16. COTTON SCALE INSECT, *Aspidiotus Gossypii*, new species.

It may not be wholly out of place in this connection to observe that almost every tree and shrub, as well as many herbaceous plants, are infested, each with a species of bark-louse or scale insect peculiar to it. As yet, however, no insect of this kind has been recorded as pertaining to the cotton plant. But on some dried specimens of the *Gossippium religiosum*, sent me from Ningpo, China, by Rev. M. S. Culbertson, of the Presbyterian Board of Missions, I find a scale insect placed along the sides of the mid-vein, upon the under surface of the leaves. It is smaller than the scales of the apple bark-louse, pale yellow, flattened, of a broad oval form, pointed at one end, the opposite or rounded end being whitish, thin, and semi-transparent. It also shows a slender raised line running lengthwise upon each side of the middle, and slight transverse wrinkles. There is reason to apprehend that this insect may find its way to our shores at some future day, and become detrimental to one of the most important staple products of our country.

17. APPLE TREE BLIGHT, *Eriosoma lanigera*, Hausmann. (Homoptera. Aphidæ.)

Small patches of white down or cotton-like wool covering a cluster of minute pale lice; situated near the root, particularly around the base of twigs and suckers growing from the trunk;

and where any wound in the bark is healing, and in autumn common also in the axils of the leaf stalks towards the ends of the twigs; sometimes so multiplied, in European countries, as to cover the whole under sides of the limbs, and also the trunk, the tree appearing as though it were whitewashed; preferring trees whose fruit is sweetest.

Under each small patch of down is commonly one large female and her young. The female is about 0.06 long, egg-shaped, dull reddish brown, with a black head and feet and dusky legs and antennæ. She is dusted over with a white mealy powder, and has a tuft of white down growing upon the hind part of her back, which is easily detached. See Harris's Treatise, p. 193.

AFFECTING THE LEAVES.

Puncturing them and extracting their juices.

18. APPLE APHIS OR PLANT LOUSE, *Aphis Mali*, Fab. (Homoptera Aphidæ.)
[Plate I, fig. 1, the male, fig. 5, the female.]

Small green lice without wings, accompanied by a few black and green ones having wings, crowded together in vast numbers upon the under sides of the leaves and the green succulent tips of the twigs, the leaves becoming distorted hereby and turned backwards, often with their tips pressing against the twig from whence they grow.

The winged individuals with a black thorax and a green abdomen, having a row of black dots along each side, and pale legs with black knees and feet. Length 0.05 to the tip of the abdomen. The wingless individuals slightly larger, with the thorax and abdomen green, the legs pale, with black feet. See Trans. N. Y. State Ag. Society, 1854, p. 753.

19. APPLE-LEAF APHIS, *Aphis Malifoliæ*, Fitch.

Found with the preceding on apple trees in Illinois; distinguished from it by being slightly larger and having the abdomen as well as the thorax black, the second fork of the wing veins at its tip nearer to the end of the fourth vein than it is to the end of the first fork, and other differences in the wing veins. See Trans. N. Y. State Ag. Society, 1854; p. 760.

APPLE. LIMBS.

20. MOULDY APHIS, *Callipterus mucidus*, new species. (Homoptera Aphidæ.)

A solitary plant-louse, walking on the leaves or hovering on the wing in their shade, having its body, legs and antennæ coated over, more or less, with pruinose matter resembling fine bluish white mould. Pale green, whitish anteriorly, legs and antennæ black, their bases pale; wings clear and glassy with a small dusky or black cloud on the tips of the veins; the rib-vein whitish to the stigma, and from thence thicker and coal black. Length 0.075.

21. THORN-BUSH TREE-HOPPER, *Thelia Cratægi*, Fitch. (Homoptera Membracidæ.) [Plate ii, fig. 5.]

On apple trees and more common on thorn-bushes, in July and August, standing upon the small limbs, and when approached by the finger, leaping away with a sudden strong spring and becoming lost to the view. A tree-hopper, shaped like a beech nut, 0.34 long, black varied with chestnut brown, with a large white spot on each side, which is prolonged forwards into a band across the front, and with a white band also across the hind part of its back, the anterior end of its back with a protuberance extending upwards perpendicularly.

In the present treatise I retain the genus *Thelia* in its original integrity, as proposed by Amyot and Serville, including in it those species only which have a horn-like protuberance, more long than wide, arising from the fore part of the thorax, and compressed and rounded at its summit. The genus as thus limited, embraces the *bimaculata* and *acuminata* Fab., the *belligera* Say, the *univittata* Harris, and the above species. In my Catalogue of the Homopterous insects in the State Cabinet of Natural History, published in 1851, I proposed the generic name *Telamona* for certain other species which could not be referred to any of the genera in Amyot and Serville's work, differing from Thelia in having a protuberance jutting up from the middle instead of the anterior part of the back, this protuberance being more wide than high when the insect is viewed in profile, and more or less square in its form. M. Fairmaire in his valuable memoir on the *Membracidæ*, in the fourth volume of the second series of the Annals of the Entom. Soc. of France, published a few years previous to my Catalogue, and giving much the most full and clear exposition of this group that has yet appeared, unites these insects to the genus *Thelia*, and also includes the genus *Smilia* of Amyot and Serville in the same genus, employing the name *Smilia* for an allied group of insects in which the apical cell of the fore wings is quadrangular instead of triangular. The *Thelia* of M. Fairmaire thus becomes an extensive genus, embracing insects which present notable differences in their external form. I know not why M. Fairmaire founds a portion of the genera in this family upon differences in the shape of the thorax, and disregards analogous differences here, especially since these differences are not in the least sexual here as they are in some of the other genera. I am therefore induced to retain the genus *Smilia* for those insects to which it was applied by Amyot and Serville, being a portion of the first section of this genus as it was originally proposed by Germar, and the equivalent of the first and second sections of M. Fairmaire's genus *Thelia*; his third section being the same with my genus *Telamona*, and his fourth section being the *Thelia* of Amyot and Serville, and of the present Report.

22. Buffalo tree-hopper, *Ceresa bubalus*, Fab. (Homoptera. Membracidæ.)
[Plate ii, fig. 4.]

A tree-hopper of similar form and the same habits with the preceding, appearing on this and most other trees from July till the end of the season. Color light grass-green when alive, freckled with whitish dots; anteriorly with a short sharp point on each side, jutting horizontally outwards, having some resemblance to the horns of a bull or buffalo. Length 0.30 to 0.40.

23. Calf tree-hopper, *Ceresa taurina*, new species.

This is like the preceding in every respect, except that the space between the horns is concave instead of rectilinear. It is the insect named *Membracis taurina* in Dr. Harris's Catalogue, and perhaps is not a distinct species from the foregoing.

Several other kinds of tree-hoppers and leaf-hoppers occur upon apple trees, but being more common on oaks, willows, and other trees, will be noticed hereafter, each in connection with the tree to which it appears to be most attached. Several of these insects puncture the tender bark of the small limbs as well as the leaves.

24. Large tree-bug, *Arma grandis*, Dallas. (Hemiptera. Pentatomidæ.)
[Plate ii, fig. 7.]

A large flat bug, the size and somewhat the shape of a pumpkin seed, but with a conspicuous sharp spine projecting outwards on each side anteriorly. Color dull pale yellowish, with numerous minute brown punctures above and red ones on the under side, and with two burnished brassy green dots near each anterior angle of the thorax. Length of the male 0.60, female 0.75. Appearing on apple, oak and other trees from July till the end of the season.

APPLE. LIMBS.

25. **Spangled tree-bug**, *Arma bracteata*, new species.

Like the preceding and of the same size, but darker colored, and having in addition to the brassy green dots of that species one on each anterior angle of the thorax, two on the middle of its anterior edge, and two others back of these last, with several small irregular greenish black spots on the scutel and wing covers. Rare. Met with in July.

26. **Spined tree-bug**, *Arma spinosa*, Dallas.

Like the foregoing, but smaller and destitute of the brassy green dots; a dusky brown spot on the membranous tips of the wing covers; beneath with a row of black dots along each side of the middle, and a large round spot on the middle of the last segment; thighs with one or two black dots near their tips. Length 0.42 to 0.52. During summer and autumn common on apple trees throughout the United States. Very similar to the Modest tree-bug, No. 101.

Beetles eating the leaves.

Rose bug, see No. 50.

27. **Cloaked Chrysomela**, *Glyptoscelis crypticus*, Say. (Coleoptera. Chrysomelidæ.)

A thick cylindrical beetle, with its head sunk into the thorax and the thorax narrower than the body; pale ash gray from being entirely covered or cloaked with short incumbent whitish hairs; the closed wing covers showing a small right angled notch at the tip of their suture; scutel dusky. Length 0.32. Mr. Say met with this insect in Missouri, and my specimens are from the same vicinity, gathered by Wm. S. Robertson, who informs me that it eats oak leaves, but seems to prefer those of the apple tree, on which it is found in abundance.

Worms eating the leaves.

Probably a greater variety of worms are able to sustain themselves upon the leaves of the apple than upon those of any other tree. Some of these will be numerous during one or two seasons and will then scarcely be seen again for several years, whilst of others a few will be met with almost every year. Some of them take on different colors and marks with every change of their skins, so that a description of the full grown worm will not apply to it when it is small. Quite a number of these worms are yet unknown to us in their perfect state. Of those mentioned below, the eight first are caterpillars, clothed more or less densely with hairs; the four next are large thick bodied worms, and the remainder are small and more slender.

28. APPLE-TREE CATERPILLAR, *Clisiocampa Americana*, Harris. (Lepidoptera. Bombycidæ.)

In May, forming large cobweb-like nests in the forks of the limbs; black, hairy caterpillars with white lines, and along each side a row of blue spots; living together in societies; finally dispersing and spinning oval white cocoons, placed in sheltered corners. The moth appearing the first of July, dull brownish red, its fore wings crossed by two straight white bands running parallel with the hind margin. Width of the wings when spread, 1.20 to 2.00. See Transactions of 1855, p. 413.

FOREST CATERPILLAR, *Clisiocampa sylvatica*. See Oak insects.

FALL WEB WORM, *Hyphantria textor*. See Cherry insects, No. 88.

HICKORY TUSSOCK MOTH, *Lophocampa Caryæ*. See Walnut insects.

29. YELLOW-NECKED APPLE-TREE WORM, *Eumetopona Ministra*, Drury. (Lepidoptera. Notodontidæ.)

Clustered closely together and wholly stripping the leaves from a particular limb, in August; when alarmed holding both ends of their bodies stiffly upward; dull yellow, cylindrical worms thinly clothed with long soft hairs, with light yellow stripes and black heads, when older becoming black with a yellow neck and light yellow stripes. The moth varying from buff yellow to auburn brown, its fore wings crossed by three to five narrow brown or blackish bands, the forward one curved and transverse, the other straight and parallel with the hind margin. Width 2.00 to 2.40. See Transactions, 1855, p. 467.

30. AMERICAN LAPPET MOTH, *Gastropacha Americana*, Harris. (Lepidoptera. Bombycidæ.)

In July, August and September, appressed to and resembling a natural tumor or swelling of the bark; a flattened ash-gray worm

2 50 long, fringed low down on each side with tufts of blackish and gray hairs, and readily known by its having above on the fore part two bright scarlet velvety bands. The moth tawny reddish brown, the inner angle of its fore wings notched as though eaten off by a worm, and commonly a pale cloud extending from this notch towards the tip, edged often on each of its sides by a zig-zag dark brown line. Width 1.50 or more. Appearing the latter part of May. See Harris's Treatise, p. 293.

31. VELLEDA LAPPET MOTH, *Planosa Velleda*, Stoll. (Lepidoptera. Bombycidæ.)

A worm similar to the foregoing in its habits and appearance, but of a faint pale green color with numerous irregular whitish lines resembling the streaks upon bark, and with a narrow black band above in the suture between the second and the third rings. The moth milk white with a large auburn brown spot on the middle of its back, its fore wings entire, dusky gray, crossed by a wavy white line near the hind edge and two others forward of this near the middle; the males scarcely half as large as the females. Width 1.25 to 2.75. See Harris's Treatise, p. 293.

32. AMERICAN VAPORER MOTH, *Orgyia leucostigma*, Smith and Abbot. (Lepidoptera. Arctiidæ.)

In winter, clusters of white eggs and a dead leaf adhering to a whitish cocoon, attached to the twigs or limbs. In midsummer a slender caterpillar with pale yellow hairs and tufts and black pencils, its head and two small protuberances on the hind part of the back bright coral red. The moth dull smoky or sooty brown, its fore wings with a white dot near the inner angle, a rhombic black spot on the outer edge near the tip, with an oblique black streak forward of it, which is often prolonged to the inner margin and forms the hind edge of a broad ash gray band crossing the middle of the wing. Variable. Width 1.20 to 1.40. Females without wings, ash gray. See Transactions, 1855, p. 441.

33. CECROPIA EMPEROR MOTH, *Attacus Cecropia*, Linn. (Lepidoptera. Bombycidæ.)

In August, consuming the whole leaf and its veins, a large cylindrical pale green worm three or four inches long and as thick as one's thumb, and having two rows of pale blue projecting points along each side, and two rows of pale yellow ones upon the back, with four larger bright orange or red ones anteriorly, all ending in little black prickles; attaching its large pod-like rusty gray cocoon to the side of a limb. The moth large, its wings dark gray, each with a large white crescent-like spot in the centre, margined with red, and beyond this a red band crossing both wings and margined on its fore side with white upon the hind pair. Appears in June. Width five to seven inches. See Harris' Treatise, p. 299.

A few words in explanation of the name of this moth may not be amiss in this connection. Sir James Edwin Smith says "we cannot in this instance commend the nomenclature of Linnæus, nor is it easy to conjecture what connection he imagined between this moth, magnificent as it is, and the city of Athens, to which its name implies it to belong." And Dr. Harris, echoing the same sentiment, remarks, "Cecropia was the ancient name of the city of Athens; its application, by Linnæus, to this moth, is inexplicable." The great legislator of this department of human knowledge, as he is expressively styled by Latreille, it has frequently been remarked, was endowed with a genius which few of his disciples have inherited, for selecting names for natural objects, which are most appropriate and happy. The idea which was present in the mind of Linnæus, when he named this splendid moth, we think is sufficiently evident. The Athenians were the most polished and refined people of antiquity. The moths are the most delicate and elegant of insects; they are the Athenians of their race. Cecrops was the founder, the head of the Athenian people. When the names of men were bestowed upon cities, ships or other objects regarded as being of the feminine gender, classical usage changed these names to the feminine form. The moths (Phalæna) being feminine, and the name of Cecrops being more euphonious in this form, probably induced Linnæus to change it in the manner he did. The name thus implies this to be the leader, the head of the most elegant tribe of insects, or in other words, the first of all the insect kind. What name more appropriate can be invented for this most sumptuous moth? It was in the cabinet of Queen Ulrica that Linnæus met with this species, and it appears that after having bestowed upon it this name, another species became known to him, vieing with this in its adornment and much surpassing it in size. One insect being already named, indicating it as the first of the whole race, what name could now be found which would suitably express the rank and importance of this new discovery? The great master was at no loss in this dilemma. The larger species was accordingly termed *Atlas*, indicating it to be the foundation upon which the whole insect world rests. How many have since been familiar with these most magnificent and princely moths, wholly unconscious of the tact and skill which Linnæus manifested in selecting the names which they bear!

Some explanation of the generic names which are adopted in this report, for this insect and those related to it, is also necessary. The name *Attacus*, meaning elegant, or connected to the Athenians, was originally given by Linnæus to a section or subgenus of his group Bombycidæ, having the wings expanded when at rest. Schrank afterwards gave the name *Saturnia* to these same insects. Germar subsequently revived the original Linnæan name, but most authors still continue the name proposed by Schrank. Duncan (Jardine's Naturalists' Library, vol. vii,) has recently proposed dividing these insects into quite a number of genera. Plain, and in the main judicious as his arrangement of them is, he in our view, improperly ignores the name *Attacus*, and unfortunately gives an erroneous location to some of the species. Thus our American *Cecropia* and *Promethea* are the two species which he figures and fully describes as illustrating his genus *Hyalophora*. Yet, as its name implies, this genus is characterised as having large hyaline glass-like spots on the middle of the wings. But no vestige of such spots exists in either of these species. The author has evidently been misled by figures, presuming the white spots represented in the centre of the wings to be hyaline, whereas they are opake. A new situation must therefore be assigned to these two insects. And as the *Cecropia* is the first species of *Attacus* named by Linnæus, after those with glassy spots are removed, it may most appropriately be taken as the type of a genus to retain the original Linnæan name, which genus is particularly distinguished by having near the tips of the fore wings an imperfect eye-like spot, formed by a round black spot margined on its inner side by a bluish white line. In the centre of the wings also, at least in one sex, is a white crescent, beyond which a white or pale red band crosses both wings. In addition to our two American species, this genus includes the East Indian *Cynthia* of Drury, the parent of the Arrindy silk-worm, noted for yielding a fabric of such durability that garments made from it outlast a person's life time, and are handed down from parents to children, like other heir-looms in a family. These three insects also present as striking a resemblance to each other in their preparatory as in their perfect states. And these species being thus disposed of, the genus *Saturnia* will remain for those moths like *Pavonia*, which have large opake eye-like spots in the centre of the wings.

34. APPLE SPHINX, *Sphinx Gordius*, Cramer. (Lepidoptera. Sphingidæ.)

The fore part of August, adhering when at rest to the under side of a twig, with the forward half of its body held obliquely outward. A thick, cylindrical apple-green worm, 2.50 long, with a reddish brown horn projecting upward from the hind part of its back, and along each side seven oblique violet stripes margined on their hind side with white. Burying itself deep in the earth and producing a large strong narrow-winged moth the following May or June, its fore wings sooty brown varied with ash gray, with black streaks between the veins and a white dot near the middle, placed upon a long slender black line. Width 2.80 to 3.50. See Silliman's Journal, vol. xxxvi. p. 295.

35. BLIND-EYED SPHINX, *Smerinthus excæcatus*, Smith and Abbot. (Lepidoptera. Sphingidæ.)

Similar in size, habits and appearance to the preceding, but the worm with a rough granular skin of an apple green color, with the horn bluish, the seven streaks along each side narrow, yellowish white, and two short pale lines before. The moth with rose red hind wings, having near their inner angle a black spot with a pale blue centre. Rare. See Silliman's Journal, vol. xxxvi, p. 290.

36. LARGE YELLOW BUTTERFLY, *Papilio Turnus*, Linn. (Lepidoptera. Papilionidæ.)

In August, commonly seen resting day after day upon a small mass of cobweb-like threads upon the upper surface of a particular leaf, a pretty, bright leaf-green, thick, smooth worm, tapering, thickest anteriorly, where on each side is an eye-like spot formed of a black spot having a pale blue centre and surrounded by a pale yellow ring which is widened on its upper side and has a short black line in this widened part. Growing to 1.25 in length and 0.40 thick. The pupa naked, attached to the side of a limb and held in its place by a silken thread passed around its body in the form of a loop. The butterfly appearing in June, of a rich pale yellow color, its wings with a broad black border in which is a row of yellow spots, and with four black streaks, the inner one extending across both pairs. Width 3.00 to 4.75. Somewhat common.

37. RED-HUMPED PROMINENT, *Notodonta concinna*, Smith and Abbot. (Lepidoptera. Notodontidæ.)

In August, in a cluster, eating all the leaves from the end of a particular limb, cylindrical prickly worms striped with black and tawny yellow, and on each side with white also, with bright red heads and a slight hump on the fourth ring, and with two rows of black prickles along the back and shorter ones upon the sides. Length 1.25. Forming a cocoon under leaves upon or slightly under the earth. The moth appearing the last of June; light brown, its fore wings dark brown on the inner and grayish on the outer margin, with a dot near the middle, a spot near each angle and several longitudinal streaks along the hind margin dark brown. Width 1.00 to 1.20. See Harris's Treatise, p. 329.

UNICORN PROMINENT, *Notodonta unicornis*, see Plum insects, No. 66.

HAG MOTH, *Limacodes pithecium*, see Cherry insects, No. 85.

38. CANKER WORM, *Anisopteryx vernata*, Peck. (Lepidoptera. Geometridæ.)

The last of May and in June, piercing small holes in the leaves and when larger consuming all the leaf except the large veins. A very variable measure-worm, nearly an inch long, ten-footed, black, clay-yellow or greenish, commonly with an ash-gray back and a pale yellowish stripe along each side. The pupa state passed under ground, the moth hatching late in autumn and on warm days in winter, but mostly early in the spring; the female gray, without wings, crawling up the trunk of the tree to deposit her eggs; the male with large very thin silky ash-gray fore wings, with a whitish spot on their outer edge near the tip and crossed by two jagged whitish bands having blackish dots along their edges, and a row of black dots at the base of the fringe. Width 1.25. Very variable, the white bands often wanting. A smaller kind (*Anisopteryx pometaria*, Harris,) without the white spot and bands and with the fore wings crossed by three interrupted dusky lines, is thought by Dr. Harris to be perhaps a distinct species. See Harris's Treatise, p. 359.

39. V-MARKED MEASURE WORM, *Erannis Tiliaria*, Harris. (Lepidoptera. Geometridæ.)

In June, eating large notches in the sides of the leaves; a very variable ten-footed measure worm 1.25 long, brownish black or pale yellow, often with black, white and pale yellow stripes along its back, its head pale with rusty freckles, and commonly a black V-shaped mark upon the front. The pupa under ground, the moth appearing late in autumn; the females wingless; the males nankin yellow, their fore wings large, thin, sprinkled with brown atoms and crossed by two wavy brown lines, the forward one often faint or wanting; a brown dot near the middle of both wings. Width 1.50 to 1.75. See Harris's Treatise, p. 370.

40. APPLE TORTRIX, *Brachytænia Malana*, Fitch. (Lepidoptera. Torticidæ.)

In June and September, eating irregular notches in the margin and holes in the middle of the leaves; a rather thick, cylindrical light green worm an inch long, with five white lines and numerous white dots. The pupa in a cocoon in a curved leaf. The moth appearing in July and again in the cold months, its fore wings ash-gray, whitish toward the outer margin, and crossed by three distant zigzag black lines which are faint or indistinct towards the inner edge. Width 0.80 to 1.15. See Transactions, 1855, p. 473.

41. UNSTABLE DRAB MOTH, *Orthosia instabilis*, Schifferrmyller. (Lepidotera. Noctuidæ.)

A worm which I have supposed was the same with that of the preceding species, but which appears to be rather thicker bodied, as though it had been fuller fed, and grows to a size a fourth larger, and enters the ground to pass its pupa state, was alluded to in my last Report. Moths which I knew had come from these larger worms, I obtained last winter. They appeared to be identical with a very common European species, named *Orthosia instabilis*, but as authors speak of that insect as feeding only upon oak leaves, I was in doubt whether I would be justified in pronouncing this which feeds upon the apple to be the same. In April, however, on going by night into a forest chiefly of oak trees, this same moth was discovered quite common there. It was clinging around the wounds made in the sugar maples, drinking the sap which flowed therefrom, and instead of flying away when the light of the lantern approached, it merely dropped itself among the dead leaves for concealment, frequently falling into the vessels of sap and drowning therein. It was evident that these moths had come from worms which had fed on the foliage of the surrounding oaks. All doubts of the insect in question being identical with that of Europe were thus resolved. The larva is described in books as being green, with a white line upon the back and a pale yellow one upon each side. It is when it is young and small that it answers to this description. When larger it commonly presents five white lines and the surface becomes freckled with white dots. I once was not a little vexed with myself on finding my memoranda of one of these worms which I was feeding, to be very incorrect; but subsequent observations showed that it was the worm that had changed. The species may well be called unstable, as not only the larva but the moth also is extremely variable; insomuch that authors have heretofore named and described a half dozen species from what are now regarded as mere varieties of this insect. It is commonly of an ash-gray color, varied more or less with rusty. Near the middle of the fore wings is a faint round spot and behind it a kidney-shaped one, of a blackish-gray color margined by a whitish line, the space between these spots rusty and often extended into a band crossing the wing. Towards their hind edge is a rusty transverse streak on the middle, and in a line with it a spot of the same color upon the outer and another upon the inner margin. Width of the spread wings, 1.50.

42. PALMER WORM, *Chætochilus Pometellus*, Harris. (Lepidoptera. Tineidæ.)

Appearing the latter part of June, at times excessively numerous, residing in worm-eaten leaves drawn together by silken threads, and when jarred dropping and hanging in the air suspended by a thread; a pale yellowish green worm, having a dusky or blackish stripe along each side of the back edged on its upper side by a narrower whitish stripe, and with a dusky line on the middle of the back. The pupa remaining in the same mass of leaves occupied by the worm, and giving out the moth in about ten days. The moth ash-gray, with its fore wings sprinkled with black atoms, and having four black dots near their middle and six or seven smaller ones around their hind edge. Width 0.65. See Transactions, 1855, p. 453.

43. TAWNY-STRIPED PALMER WORM, *Chætochilus Malifoliellus*, Fitch.

The fore part of July, residing in a folded worm eaten leaf; a slender pale yellowish worm with a tawny yellow stripe along each side of its back, this stripe having a white stripe upon its lower as well as its upper side, and a pale yellow head. The moth like the preceding, but the fore wings not sprinkled with black atoms, and having, in addition to the dots of the common palmer worm moth, a tawny yellow band toward the tips of the wings, edged with whitish on its fore side. See Transactions, 1855, p. 463.

44. COMRADE PALMER WORM, *Chætochilus contubernalellus*, Fitch.

Appearing in company with the Palmer worm, and closely resembling it, but having the head and neck shining black instead of light yellow. The moth also sprinkled and dotted like that of the Palmer worm, but the ground color of the fore wings dark brown on their inner and white on their outer half. See Trans. 1855, 464.

45. EYE-SPOTTED BUD MOTH, *Spilonota oculana*, Harris. (Lepidoptera: Tortricidæ.)

In May and June, with silken threads fastening the young leaves together as they are starting from the buds, and living within and feeding upon them; a small pale dull brownish worm with shining elevated dots each giving out a fine hair, its head, neck and a spot on the top of the eighth ring dark brown. Changing to a pupa in the same nest, from which the fore part of July comes a small moth of a dark ash-gray color, its fore wings whitish in the middle, mottled with dark gray, the tips light brown with four little black marks forming an eye-like spot, and another near the inner angle formed by three minute black spots arranged in a triangle, having often a black dot in its centre. Width 0.50 to 0.60. This is probably identical with the European *ocellana* of Schifferrmyller, afterwards named *luscana* by Fabricius and *comitana* by Hubner, Stephens, and others. See Harris's Treatise, p. 377.

46. ROSACEAN TORTRIX, *Lozotænia Rosaceana*, Harris. (Lepidoptera. Tortricidæ.)

In May and the fore part of June, with silken threads drawing together the young leaves at the ends of the limbs, secreting itself within them and feeding thereon; a slender pale green or yellowish green worm, sometimes flesh red or brownish, 0.75 long, its head and neck above brownish, often a darker green stripe along its back, and with a few smooth dots, each yielding a short fine hair; changing to a pupa within its nest, from which about the first of July comes a short broad flat moth, resembling a bell in its outline, its color dull nankin or drab yellowish, of a dusky shade from numerous small wavy dark brown lines crossing its fore wings, on which are three slightly darker broad oblique bands, situated upon the base, the middle and the hind part. Width of the spread wings 1.10. See Harris's Treatise, p. 376. Both the worms and the moths vary greatly as they are reared upon rose, apple, peach or cherry and other leaves, and it is very doubtful whether this is different from a common European insect possessing the same habits—the Rose Tortrix (*L. Rosana*, Linn.) the several varieties of which have heretofore been regarded as distinct species.

47. ROSY HISPA, *Uroplata rosea*, Weber. (Coleoptera. Hispidæ.)

In July, large brownish blister-like spots appearing upon the leaves, from a leaf-mining worm in their interior, eating the green parenchyma and leaving the skin entire; the worm 0.20 long, tapering, flattened, soft, yellowish white, its head and neck blackish; changing to a pupa in the leaf, from which in six or seven days comes a small flat coarsely punctured beetle, its wing covers forming an oblong square, tawny yellow, posteriorly red or purple, which color extends forward to the shoulders and onwards upon the sides of the thorax in a stripe which is often black. . Length

0.20 to 0.25. Variable in its colors. This is the *Hispa quadrata* of Fabricius; whether it is the anteriorly described *rosea* of Weber is somewhat doubtful. See Harris's Treatise, p. 106.

AFFECTING THE FRUIT.

48. CODLING MOTH, *Carpocapsa Pomonella*, Linn. (Lepidoptera. Tortricidæ.)

Feeding upon the core and its seeds, causing much of the young fruit to wither and fall, and occurring also in ripened stored apples; a small white worm with a shining black head and neck and with little smooth dots arranged in pairs, each giving out a fine hair; when larger becoming flesh colored with a tawny brown head and neck; in summer completing its growth in three or four weeks, and coming out through a hole gnawed in the side of the apple; surrounding itself with a white web in a crevice of the bark or similar situation and there passing its pupa state; the moth appearing the latter part of June, but straggling individuals occurring the whole year round, dropping their eggs singly upon the flower end of the apple, from which the young worm penetrates inward to its centre. The fore wings of the moth occupied by alternate irregular transverse wavy streaks of ash-gray and brown, and on the inner hind angle a large tawny brown spot, which is bordered by a brilliant golden mark nearly in the form of a horse shoe. Width 0.75. See Kollar's Treatise, p. 229.

49. APPLE MIDGE, *Molobrus Mali*, Fitch. (Diptera. Tipulidæ.)

In the interior of ripened and stored apples, accelerating their decay, whilst the outer surface remains fair; numerous slender tapering glassy-white maggots; changing to pup in the interior of the apple, from whence come a small slender black midge, 0.15 long, its abdomen blackish with a pale yellow band at each of the sutures, and its wings hyaline tinged with smoky. See Transactions, 1855, p. 484.

PLUM WEEVIL. This makes the same crescent-shaped wound upon young apples as on plums, causing them to drop to the ground prematurely. See Plum insects, No. 70

APPLE. FRUIT.

50. Rose bug, *Macrodactylus subspinosus*, Fabr. (Coleoptera. Melolonthidæ.)

Clustering, sometimes in multitudes, upon the young apples and devouring them, the latter part of June, and when these do not suffice it, eating the leaves also; infesting likewise roses, grape vines, plums and cherries:—a smallish oblong buff-yellow beetle, with shining yellow legs and very long black feet. Length 0.35 to 0.40. See Transactions, 1855, p. 477.

51. Apple Thrips, *Phlæothrips Mali*, Fitch. (Thysanoptera. Thripididæ.)

Appearing in a roundish cavity ate near the tip end of the young fruit; a minute, very slender blackish-purple insect with narrow silvery-white wings lying upon its back resembling a long Y-shaped mark. Length 0.06. See Transactions, 1854, p. 806.

Wasps and Hornets are frequently in the habit of feeding upon growing apples and other sweet fruits, gnawing small roundish cavities in them, and also in autumn when prepared apples are placed in the sun to dry numbers of the same insects are again attracted to them. The common hornet, *Vespa maculata*, Linn., the yellow jacket, as it is usually designated, *Vespa vulgaris*, Linn., and our common wasp, *Polistes fuscata*, Fab., are the chief species which depredate in this manner. But as these insects are most important on account of the injuries they are liable to inflict upon our persons, the description of them more appropriately belongs to another branch of this subject.

2. THE PEAR.—*Pyrus communis.*

Most of the insects which infest the apple will be found to attack the pear also, in the same manner, these two trees being so closely related to each other. It will not therefore be necessary to repeat their names. A few insects, however, appear to pertain to the pear exclusively, and some belonging to other trees are found upon the pear that have not yet been noticed upon the apple. These are named below.

AFFECTING THE TRUNK, BARK AND LIMBS.

52. Pear-tree borer, *Trochilium Pyri*, Harris. (Lepidoptera. Trochiliidæ.)

Particles of powder, like sawdust, appearing upon the bark, thrown out by a worm underneath, resembling the Peach-tree borer, but much smaller; feeding mostly upon the inner layers of the bark and there changing to a pupa; the moth coming out in autumn, resembling a wasp, of a purple black color with a broad yellow band on the middle of its abdomen and two narrow ones forward of it, its under side golden yellow and its wings clear and glass-like, their veins, margin and fringe purplish black, and the ends of the forward pair blackish with a coppery yellow gloss. Width 0.55. See Harris's Treatise, p. 256.

Pigeon Tremex, *Tremex Columba*, a large soft white worm boring deep in the interior of the wood. See Maple insects.

Plum weevil, *Conotrachelus Nenuphar.* (See No. 70.) In the winter season, small crescent-shaped incisions appearing in the smooth bark of the limbs, with the bark upon the convex side of this wound elevated in a slight blister, in the cavity of which lies several minute maggots, supposed to be the larvæ of the plum weevil in their winter quarters.

I am reluctant to publish any observations which are not fully completed and known to be fully authentic. An affection of the bark of the pear tree, however, has been presented to my notice, which is of too much interest to be omitted in this place, although

I am not perfectly certain that it is caused by the insect to which I attribute it. The importance of the facts which I have to report, will appear from a few preliminary remarks.

The history of the plum weevil or curculio, so far as at present known, is briefly as follows. The beetle makes its appearance in May and June, cuts a crescent-shaped incision in young plums and other fruits, dropping an egg in the wound, the worm from which, boring in the fruit, causes it to fall from the tree, and the worm becoming full grown, buries itself in the ground, where it remains from three to six weeks, and having completed its transformations the beetle again comes abroad in July and August. But what becomes of it from this time until the following spring is not yet ascertained. Although this insect and its destructive habits have been so long known in this country, and every owner of a plum tree has year after year endured the most vexatious disappointments from it, we to this day remain in ignorance of its abode and condition during half the year. Most persons who have written upon it, have supposed that some of the worms were so late in leaving the fruit that they remained in the ground through the winter and from these come the beetles which appear in the spring; and several of the remedies which have been recommended for abating this evil have been based upon this theory. But that a whole generation of these insects should be brought forth abortively each summer, to perish without making any provision for a continuance of their species, and that their perpetuity should every year be left to such a mere accident as a few individuals casually belated in coming to maturity, would be an anomaly wholly unlike anything which we meet with elsewhere in this department of nature's works. And Dr. E. Sanborn of Andover, Mass., in several communications published in the Boston Cultivator and Cambridge Chronicle in 1849 and 1850, gives it as the result of a series of observations which he had made upon the larvæ, that at no season of the year do they remain longer than six weeks in the ground, and that neither they nor the perfect insects lie under the ground during the winter. Dr. Harris hence infers, in the last edition of his Treatise, that those beetles which come out the latter part of summer lurk in some place not yet discovered, during the winter, to come abroad again in the spring and deposit their eggs in the fruit.

But I now come to present a fact which I think will be more satisfactory to the reader as to the place and circumstances in which this insect passes the winter, than anything which has yet been given to the public. In April, 1856, I received from L. B. Langworthy of Rochester, a portion of the limb of a pear tree, four and a half inches long and less than half an inch thick, upon which were about thirty short curved or crescent-shaped incisions in the bark, similar to those made by the curculio upon fruit. They were all cut lengthwise of the bark, about 0.15 in length, and upon their convex side the outer layer of the bark was elevated in a little blister-like spot extending the whole length of the crescent and about half as broad as long. On raising this, so as to expose the cavity beneath, several little worms, commonly six in number, were found therein, torpid and lying in a row side by side with their tails toward the crescent and their mouths in contact with the soft green pulp or parenchyma forming the middle layer of the bark, ready to eat their way onwards as soon as the warmth of spring awakened them again to activity. These worms were rather long and narrow, 0.05 in length, broadest across their middle, tapering to a point at one end, the opposite or head end being rounded. They were without feet, transparent and pale yellowish, resembling little specks of gum or turpentine. They had evidently come from eggs which had been dropped in the curved incision. A few of these incisions had no elevation of the bark along their side, in which instances the weevil had doubtless been disturbed and abandoned her work before it was completed, or the eggs which she deposited in the incision had been discovered and devoured by some predaceous insect.

Although until these worms have been reared we cannot be certain what they are, there is the strongest presumptive evidence that they are the progeny of the plum weevil. Fifty years ago, one of the best authorities in our country upon a topic of this kind, Rev. F. V. Melsheimer of Pennsylvania, stated that the larva of this insect lived under the bark of the peach tree. But from that day to this, no one of the many who have undertaken to investigate this insect, have given any confirmation of this statement. Yet in the light of what is reported above, we cannot but regard it as true. We are informed by Kollar, that the plum weevil of Europe (*Rhynchites cupreus*) when there is no fruit for it, resorts to the new shoots in which to place its eggs. All the circumstances, therefore, lead us strongly to the opinion that the conjecture advanced by Dr. Harris in the first edition of his Treatise, but since abandoned by him, is correct, namely, that those beetles which are hatched the latter part of the season, finding no young fruit in which they can deposit their eggs, are obliged to resort to the smooth tender bark of the branches of our different fruit trees, and the worms from these eggs repose in, not under the bark, through the winter, and produce the beetles which appear the following June and oviposite in the young fruit.

If this opinion as to the winter quarters of the curculio proves to be correct, it may lead us to most important results. After allowing for all casualties, it is probable that a hundred beetles might have been matured from the short piece of limb which came under my observation. The worms, however, are only covered by the epidermis and the thin outermost layer of the bark. Soft-soap or some other alkaline substance applied externally, there is little doubt would penetrate through this covering sufficiently to destroy these worms when they are so small and tender. And it appears probable that by a careful inspection of the limbs of those trees whose fruit has been destroyed and other trees standing adjacent to these, the winter retreat of this enemy may be discovered by the marks he places upon the bark, and a remedy may then be applied with greater ease and which will be more effectual for his destruction than anything hitherto suggested.

53. PEAR BARK-LOUSE, *Lecanium Pyri*, Schrank. (Homoptera. Coccidæ.)

A hemispherical shell, the size of a half pea, of a chestnut brown color, adhering to the under side of the limbs. See Transactions, 1854, p. 809.

54. SCURFY BARK-LOUSE, *Aspidiotus furfurus*, new species. (Homoptera. Coccidæ.)

Little round or oval white wax-like blisters on the smooth bark of the pear tree.

I know this only from specimens found upon the same limb of the pear tree from the garden of L. B. Langworthy of Rochester, on which the incisions of the plum weevil above spoken of occurred.

The bark of this limb was covered with an exceedingly thin gray film, appearing as though it had been coated over with varnish, which had dried and cracked and was peeling off in small irregular flakes, forming a kind of scurf or dandruff upon the bark. In places this pellicle was more thick and firm and elevated into little blister-like spots of a white color and waxy appearance, of a circular or broad oval form, less than the tenth of an inch in diameter, abruptly drawn out into a little point at one end, which point was stained of a pale yellowish color and commonly turned more or less to one side. On breaking open any of these spots with the point of a needle, quite a number of exceedingly minute oval eggs of a glossy bright purple color were found beneath. These eggs probably produce mites of such minute size as to be wholly imperceptible to the naked eye, myriads of which, there is little doubt, at times overrun the bark of particular trees of this kind, exhausting their juices and causing them to pine and droop, when the proprietor is wholly unable to discover the occasion of their unthriftiness. The habits and changes of this insect will be similar to those of the Apple bark-louse, (No. 15) and other kindred species. It is probably this species as it appears in autumn, of which, as this page is passing through the press, I notice some valuable observations by A. O. Moore, in the American Agriculturist, vol. xvi., p. 287.

55. Pear-tree Psylla, ***Psylla Pyri*****, Linn.** (Homoptera. Psyllidæ.)

The smaller limbs and twigs drooping, their bark rusty blackish, and a multitude of ants and flies gathering around them to feed on the honey dew which is dropped copiously by a small yellow jumping insect resembling a louse, which punctures the bark and sucks its juices, frequently killing the tree. After the middle of summer appearing with transparent wings, and its head deeply notched in front, its color now being orange yellow with the abdomen greenish. Length 0.10. See Harris's Treatise, p. 202.

56. Pear blight beetle, *Scolytus Pyri*, Peck. (Coleoptera. Scolytidæ.)

Particular twigs of the pear, apple, plum and apricot suddenly withering and dying in the middle of the summer; small perforations like pin holes appearing at several of the buds, from which perforations issue a small cylindrical beetle of a deep brown or black color, its antennæ and legs rust-yellow. Length 0.10. This works also in the trunk of the tree, earlier in the season, as already stated, page 327. See Harris's Treatise, p. 78.

AFFECTING THE LEAVES.

CHERRY SLUG-WORM, *Celandria Cerasi.* A shining slimy blackish slug worm, shaped like a tadpole, in June and July consuming the parenchyma of the leaves and leaving their veins entire; some years destroying almost the whole of the foliage. See Cherry insects, No. 92.

57. GOLDSMITH BEETLE, *Areoda lanigera,* Linn. (Coleoptera. Scarabæidæ.)

In May and June, eating the leaves of this and of various forest trees, a large thick oval beetle of a shining lemon-yellow color, its thorax of a greenish golden tinge, and its under side coppery or dark green with white hairs. Length 0.80 to 1.00. See Harris's Treatise, p. 21.

AFFECTING THE FRUIT.

58. PEAR BLISTERING FLY, *Cantharis Pyrivora,* new species. (Coleoptera. Meloidæ.)

Early in June devouring the young fruit, a long cylindrical blistering beetle, of a green-blue color and not shining, its legs orange yellow with the hips, knees, feet and tips of the shanks blue-black and the antennæ black. Length 0.90.

For specimens of this insect I am indebted to my friend Wm. S. Robertson, who informs me they were taken upon a pear tree at Canajoharie about the first of June, 1838. Soon after its flowers had fallen these beetles made their appearance, in numbers, eating the young fruit voraciously and in a short time destroying all or nearly all upon the tree. I have also received this same insect from the southern section of the State. It equals in size our largest American Cantharis hitherto known, the *Nuttallii* of Say (*fulgifer* Le Conte) but is destitute of the brilliancy belonging to that species. As the insects of this genus vary in their size it is with considerable hesitation that I enter this as a distinct species, it corresponds so closely in its colors and other characters with the *ænea* Say (*nigricornis* Le Conte). My examples of that species, however, have the exact dimensions assigned to it by Say and Le Conte (0.55), whilst all my examples of this species are more than a third larger. They moreover have the anterior as well as the middle shanks curved.

To test the blistering qualities of this species three of the legs of a specimen nineteen years old were pulverized and mixed with a little cerate and bound upon my arm. In six hours the spot was as nicely vesicated as though the best Cantharides of the shops had been employed.

The worm of the Codling moth (No. 48) and of the Plum weevil (No. 70) are as prone to infest the interior of pears as of apples.

3. THE QUINCE.—*Cydonia vulgaris.*

The only insects known to us as occurring upon the quince are the same that are found upon the apple, and also the Cherry slug worm, No. 92. Its worst enemy is the Apple tree borer (No. 2) which appears to prefer the quince to any other tree; and in districts where this insect abounds it is found to be almost impossible to grow this fruit.

4. THE PEACH.—*Persica vulgaris.*

AFFECTING THE ROOT.

59. Peach-tree Borer, *Trochilium exitiosum*, Say. (Lepidoptera. Trochiliidæ.) [Plate I, fig. 6 the male, fig. 7 the female.]

Boring in and eroding the bark and solid wood, causing the gum to exude so copiously as to form a thick mass around the root intermingled with the castings of the worm, which is cylindrical, soft, white, with a tawny yellowish red head and sixteen feet, and grows to more than half an inch in length. It forms a tough pod-like cocoon on the side of the root, jutting slightly above the surface. The moth comes abroad the last half of July and in August, and resembles a wasp in its appearance. It is of a dark steel blue color, and in the male the wings are clear and glassy with a dark blue band extending nearly across the forward pair beyond the middle, whilst in the female only the middle of the hind wings are clear and glassy and her abdomen has a broad bright orange yellow band upon its middle. Width 0.80 to 1.30. See Transactions, 1854, p. 813.

This important insect is so well known throughout our country under the technical name *Ægeria exitiosa* that it is unfortunate this term cannot remain undisturbed. But so long ago as 1777 Scopoli gave the name *Trochilium* to the same insects for which the Fabrician name *Ægeria* was published thirty years afterwards. The latter name, therefore, is merely a synonym of the former, and is wholly rejected by the latest and best authorities.

AFFECTING THE TRUNK AND LIMBS.

Apple Buprestis, a flattened pale yellow grub under the bark mining in the sap wood. See No. 3.

Divaricated Buprestis, a worm similar to the preceding and found in the same situation. See No. 71.

60. Elm bark-beetle, *Tomicus liminaris*, Harris. (Coleoptera. Scolytidæ.)

Small perforations like pin holes appearing in the bark particularly of diseased trees, from which in August and September issues a minute cylindrical bark-beetle of a dark brown color, its wing covers with deeply impressed punctured furrows and short hairs and its thorax also punctured. Length 0.10 or less. I have obtained this from elm bark, the same situation in which Dr. Harris found it, and this is doubtless its original residence. But Miss Margaretta H. Morris has met with it under the bark of peach trees which were affected with "the yellows." See Downing's Horticulturist, vol. ii, p. 502.

The **Peach-tree borer** above described (No. 57) is not confined to the root, but frequently occurs also under the bark of the trunk, particularly in the forks of the limbs, causing the gum to exude from the spot where it nestles.

The **Oak pruner**, or a species possessing the same habits, bores in the heart of the small limbs, the latter part of summer, a few inches or a foot or more in length, and then girdles the limb, severing the wood as smoothly as though it were cut off bv a saw. See insects of Oak limbs.

61. **Peach bark-louse**, *Lecanium Persicæ*, Modeer. (Homoptera. Coccidæ.)

Fixed to the smooth bark, commonly beside a bud on the origin of a twig, a blackish hemispherical shell the size and shape of a half pea, its surface uneven, shining, commonly showing a pale margin and stripe upon the middle; covering a multitude of minute eggs which hatch small lice like mites, which scatter themselves over the bark, puncturing it and sucking its juices, similar to the pear bark-louse No. 51.

AFFECTING THE LEAVES.

62. **Peach Tortrix**, *Cræsia Persicana*, new species. (Lepidop. Tortricidæ.)

Early in May when the young leaves are putting forth from their buds, a worm tieing them together with fine silken threads, secreting itself within and feeding upon them; the worm rather slender, pale green with a whitish streak along each side of its back and a pale dull yellowish head; changing in its nest to a pupa about the middle of June and giving out the winged moth the beginning of July. The moth with the fore wings rusty yellow varied with black, their basal third much paler tawny yellow; a large triangular white spot on the middle of the outer margin; a transverse white streak forward of the middle of the hind edge, which is divided by the veins crossing it into about four spots, and is bordered on its anterior side by a curved black band. Width 0.65.

Having bred this moth from worms gathered upon the peach, I name it accordingly, though it is quite probable that, like other insects of this family, it feeds upon the foliage of several different trees. I have never observed it till the present season, and presume that like many of its kindred, it will be common at times, and will scarcely be seen again for several years. Of the species mentioned in the books it most resembles the *Schreberiana* as figured by Wood and described by Stephens (Haustellata, iv, p. 81.) We learn, however, from Stephen's List of the British Museum, that the specimen from which this figure and description were taken is suspected to be North American, and is not the true *Schreberiana*, but according to Mr. Doubleday (Zoologist, v. p. 1729) is the *trileucana* of Gmelin. There must be some error in this citation, however, as no species bearing this name occurs in Gmelin. Even though the specimen alluded to should be American and already named, the insect before us appears to be a different species, that having, among other discrepancies, a pale streak upon the hind edge of the fore wings, whilst here the corresponding streak is distinctly forward of the hind edge.

ROSACEAN TORTRIX. Another worm tieing peach leaves together in the same manner and at the same time with the preceding, differs from it in being destitute of the whitish stripe or line along each side of the back. It is light green with a line along the middle of the back of a deeper green color, which is often faint or wholly wanting. I have frequently found these worms upon the peach, and some of them which I have reared have produced moths which I can only regard as being a dark colored variety of the exceedingly variable Rosacean Tortrix already described. See No. 46.

The APPLE SHOULDER-STRIPED TORTRIX also feeds upon the leaves of the peach, but makes no nest in which to secrete itself.

It closely resembles the foregoing, but has three white or pale yellow stripes when young, and five when mature, and is also then freckled with pale dots. See No. 40.

The Unstable drab moth, occurs also upon the peach, at the same time with the preceding, and most closely resembles it as already stated. See No. 41.

63. Peach Aphis, *Aphis Persicæ?* Sulzer. (Homoptera. Aphidæ.)

This begins to appear upon the first small leaves which protrude from the buds and continues through the season unless swept away, as it frequently is, with surprising suddenness, by its several insect enemies. (See Transactions, 1854, pp. 767–806, where a full account of our American destroyers of the Aphides will be found.) It punctures the leaves to suck their juices and is a common though probably not the only cause of "the curl." It lives together in crowds, hid in the crevices of the curled, corrugated leaves, most of the individuals being larvæ and wingless females. The winged individuals are 0.12 long, black with the under side of the abdomen dull green, the shanks and bases of the thighs pale brownish, and the horns or horny tubes as long as to the tip of the abdomen. This would appear to be different from the European peach aphis as figured in Koch's invaluable monograph and described by Fonscolombe and others, though the wing veins coincide with Walker's description. I however have not yet given this insect a careful examination, and have noticed individuals so unlike those above described that they seemed to be another species.

The Buffalo tree-hopper, a light green jumping insect shaped like a beech nut, puncturing and sucking the juices. See No. 22.

The Saddled leaf-hopper, a smallish oblong black jumping insect with a large bright yellow spot like a saddle upon the middle of its back. See No. 69.

AFFECTING THE FRUIT.

The Plum weevil (No. 70) bores in the young fruit, causing it to drop from the tree. The Rose bug (No. 50) sometimes invades this fruit also, nibbling and killing it.

5. THE NECTARINE.—*Persica lævis.*

The Plum weevil (No. 70) and other insects which depredate upon the peach are liable to attack this tree in the same manner.

---

6. THE APRICOT.—*Armeniaca vulgaris.*

The Pear blight beetle (No. 56) sometimes kills particular twigs of the apricot in summer. The Plum weevil (No. 70) bores in the fruit, and several of the other insects which attack the plum may at times be met with upon this tree.

---

7. THE PLUM.—*Prunus domestica, et al.*

AFFECTING THE ROOT.

The Peach tree borer (No. 59) occurs in the root of the plum also, boring under the bark and destroying young trees, but without causing any gum to exude as it does in the peach. See Transactions, 1854, p. 816.

AFFECTING THE TRUNK AND LIMBS.

The Pear blight beetle (No. 56) occasionally causes the death of a single twig upon one part and another of this tree in summer.

64. Unarmed tree-hopper, *Smilia inermis*, Fab. (Homoptera. Membracidæ.)

In August and September, making straight short incisions, about 0.10 long, in the bark of the small limbs, particularly where the new growth of the year commences, and dropping a little cluster of minute eggs therein, which remain till the sap begins to circulate the following spring, when they hatch insects resembling small mites, which immediately wander away from the spot and subsist upon the juices of the leaves and green succulent twigs, which they puncture with their minute sharp beaks. These insects will be found fully grown in July and are then about 0.28 long and of a triangular shape, resembling that of a beech nut, and of a uniform pale green color without any spots or stripes. Like other tree hoppers (which name I apply to insects of the family *Membracidæ*) and leaf hoppers (*Tettigoniidæ*) these insects when approached by the finger give a sudden strong leap and become lost to the view.

I am indebted to George Clark, Esq., of East Springfield, Otsego county, for the above information respecting the work of an insect, which, from his description of it, will be the species which I have named; but specimens which were sent to Dr. Harris a few years since, were said to be the *Ceresa bubalus* (See No. 22) in a letter from him, published at that time in the Journal N. Y. State Ag. Society. Mr. C. informs me the insect he alludes to has no projecting points resembling horns, anteriorly, and is of a uniform pale or pea green color, destitute of any spots or marks, whereas the *bubalus* when alive is deeper green, freckled with whitish dots, and has a pale yellow streak from the horn backwards along each side. The *bubalus*, however, is closely related to this insect and is common upon the fruit and other trees in our yards, and both these species it is probable cut the bark of the plum and other trees in the manner stated above, and we presume the plum weevil also makes a curved incision in the limbs of the plum similar to those we have noticed in the pear.

Mr. Clark has for several years given particular attention to the slits which this tree hopper makes in the bark of the plum and is confident these wounds are the foundation of that most fatal malady the "Black knot." The examinations of this disease which I have made have convinced me that the different insects which writers in our agricultural periodicals have pointed out as producing these excrescences are species which are wholly innocent of the crime laid to their charge. I have watched the growth of the excrescences from their first commencement to their full development, without being able to detect the least indication of an insect in some of them, and in other instances where insects have been present it was plain they were there as a consequence and not as a cause of the disease. The fact, however, that tree hoppers and the plum weevil make incisions in the bark at the same place where this disease shows itself, calls for future investigations, to ascertain whether it is not these incisions which lay the foundation for this disease, as Mr. Clark states. Where the incisions are made by tree hoppers the insects will all escape before the swelling in the limb commences, but the slits in the bark will remain, to prove that these insects have been there. Where the plum weevil makes the incisions its larvæ will be present in the excrescence; and this will account for the fact long ago published by Prof. Peck, that he had bred the plum weevil from these excrescences, and hence inferred it was this insect which caused this disease.

AFFECTING THE LEAVES.

The May beetle a large thick-bodied chestnut or black beetle about the middle of May eats the leaves of this and the cherry tree. See No. 75.

The Rose-bug, a smaller buff yellow beetle also feeds upon them the last of June. See No. 50.

The Grape-vine flea-beetle, No. 128, sometimes eats numerous small holes in plum leaves also. A young plum tree in my yard had its leaves nearly all destroyed by this insect, every summer, for many years in succession, and other trees near this were more or less injured. Dusting the leaves with caustic and bitter powders proved to be of little if any benefit. At last I resolved to give this unfortunate tree a respite from its enemies, for one season at least, and accordingly picked off and crushed in my fingers every insect that could be found upon it. They were less active after sunset, and with a sudden dart one or two could be caught between the thumb and finger upon almost every leaf. From fifty to two hundred were thus killed daily, for a week or longer, and the hunt was persevered in as long as any insects could be found. This treatment was even more successful than I anticipated, for I have never seen a flea beetle upon my plum trees since that season.

65. Plum Sphinx, *Sphinx drupiferarum*, Smith and Abbott. (Lepidoptera. Sphingidæ.)

A large cylindrical apple-green worm with a curved violet-blue horn on the hind end of its back, and along each side seven oblique white streaks margined with violet upon their upper sides the head with a white stripe on each side. The pupa unde ground, giving out the moth the following June, which hovers about flowers at dusk, resembling a humming bird in its motions; its fore wings measuring from 3.20 to 4.50 when spread; half their surface occupied by a broad dark brown band extending from their inner margin to the tip, in which are about five slender oblique coal-black streaks; the space forward of this band pale reddish gray or ashy clouded with hoary white, and having near the middle a blackish crescent crossed by a long very slender black line; its abdomen gray with a black stripe along the middle, and the sides black with a row of white spots.

The CECROPIA EMPEROR MOTH, No. 33, a large pea green worm with two rows of small yellow prickles on the back and blue ones on the sides, is occasionally met with on the plum.

66. UNICORN PROMINENT, *Notodonta unicornis*, Smith and Abbot. (Lepidoptera. Notodontid.

In August and September, a worm eating a notch in the side of the leaf, often of the exact length of its body, and placing itself in this notch, with the humps of its back resembling the teeth along the edge of the leaf, eventually consuming all the leaf but a small portion of its base; the worm brown like a faded leaf, with its second and third rings leaf green, its head large, and on top of the fourth ring a long horn-like protuberance; growing to 1.25 in length; forming a cocoon on the ground under fallen leaves; the moth appearing in July; its fore wings light brown with patches of greenish white and many dark brown lines, the hind margin white and near the inner angle a small white and two black dashes. Width 1.25 to 1.50. See Harris's Treatise, p. 327.

67. WAVED TUSSOCK MOTH, *Trichetra opercularis*, Smith and Abbot. Lepidoptera. Arctiidæ.)

A caterpillar with brownish evenly shorn hairs rising to a ridge along the middle of the back and sloped off on each side like the roof of a house; making a tough oval cocoon in September, which is fastened to the side of a twig, its top opening by a flat circular lid, the moth coming from it the following July. This moth is most readily distinguished by the fine prostrate curled hairs covering its fore wings and arranged in regular waves running as it were from the base to the tip. Its body and legs are also very hairy and at the tip of the abdomen is a tuft of long soft hairs forming a bushy tail. It is of a straw yellow color with the fore wings more or less dusky on the outer margin, and the feet and orbits of the eyes black. The fore legs are often black on their anterior side and sometimes the face is also black. Width 1.20 to 1.80. I have never met with this in New-York and it is omitted in the second edition of Dr. Harris's Treatise, but it appears to be common at the south and west. The *Sparshalli* of Mr. Curtis can scarcely be distinct from this somewhat variable species, and I suspect Mr. Stephens (List Brit. Mus.) is in error in giving that as an Australian insect and that Boisduval was correct in regarding it as North American. Mr. Westwood's generic name *Trichetra* was published the year before Dr. Harris's name *Lagoa*.

AMERICAN VAPORER MOTH. A slender pale yellow caterpillar, its head and two little knobs on its back bright coral red. See No. 32.

The APPLE TREE CATERPILLAR No. 28, and the FALL WEB WORM No. 88, frequently place their cobweb-like nests on plum trees.

The CANKER WORM. A measure worm eating holes in the leaves in June. A gray soft hairy wingless insect crawling up the body of the tree early in spring. See No. 38.

SLUG WORMS. Slimy blackish worms in June and July, eating the green parenchyma and leaving the veins entire. See No. 92.

68. PLUM-LEAF APHIS, *Aphis Prunifoliæ*, Fitch. (Homoptera. Aphidæ.)

Puncturing the leaves and sucking their juices, causing them to become wrinkled and distorted; a black shining plant-louse with a pale green abdomen. Length 0.14. See Transactions, 1854, p. 826.

PLUM. FRUIT.

69. Saddled leaf-hopper, *Bythoscopus clitellarius*, Say. (Homoptera. Tettigoniidæ.)

A small cylindrical slightly tapering leaf-hopper, 0.20 long, black or dark brown, with a bright sulphur-yellow spot like a saddle upon the middle of its back, a band forward of this and also the head and under side pale yellow, the forehead with two black dots. This probably punctures and sucks the juices of the green succulent twigs as well as the leaves, but I have particularly noticed it standing upon the fruit stems with its beak inserted therein, extracting the fluids which should go to swell and perfect the fruit. And it would thus seem that these leaf-hoppers, like many other insects, are actuated by a spirit of pure malevolence in making their attack upon that part of the plant where they will do us the most injury, when they might nourish themselves equally as well in places where their harm would be slight.

AFFECTING THE FRUIT.

70. Plum weevil, or Curculio, *Conotrachelus Nenuphar*, Herbst. (Coleoptera. Curculionidæ.)

Making a small crescent-shaped incision upon the side of the young fruit and dropping an egg therein, from which comes a small white footless worm or grub which bores in the fruit, causing it to become diseased and gummy and to drop from the tree, the worm when full grown entering the ground and in three or four weeks coming out in its perfect state, when it is a short thick rough beetle, shaped somewhat like a pear, and with a long snout like an elephant's trunk hanging down in front, its color dark brown with a broad white or yellow band on the hind part of the wing covers, and small spots of black, white and yellow. Length 0.15 to 0.28. For the winter residence of this weevil, see insects of pear limbs, p. 349. See Harris's Treatise, p. 66.

8. THE CHERRY.—*Cerasus vulgaris, et al.*

Though some of the insects noticed below have only been observed upon our wild cherries, *Cerasus serotina* and *Virginiana*, there is little doubt but the same will at times invade the garden cherry; and all the trees of this genus are so closely related to each other that, for a purpose like the present, it appears unnecessary to divide them into different heads.

AFFECTING THE TRUNK AND LIMBS.

71. Divaricated Buprestis, *Dicerca divaricata*, Say. (Coleoptera. Buprestidæ.)

A flattened worm resembling a tadpole and otherwise similar to the Apple Buprestis, No. 3; mining in the sap wood under the bark; the perfect insect appearing the last of June and through July, running up and down the trunk of the tree in the sunshine; a thickly punctured snapping beetle, having a coppery lustre, its wing covers striated and freckled with small blackish spots, their ends narrowed, drawn out and spreading slightly apart, the tips blunt and as though broken off. Length 0.70 to 0.90. The beech is undoubtedly the original residence of this insect, and wherever a dead tree of this kind occurs some of these beetles will almost always be found upon it on sunny days in midsummer. I know not why, in the lately published Catalogue of F. E. Melsheimer, Kirby's generic name *Stenuris* is preferred to that of Eschscholtz, whilst on a following page precedence is given to one of the generic names of the latter author over one proposed by Mr. Kirby. As Eschscholtz's names for these genera were published several years anterior to those of Kirby I have retained them. For some further items respecting this insect see Harris's Treatise, p. 42.

The Rough Osmoderma No. 7, and the Horn-bug No. 6, occur in their larva state in old decaying cherry trees, and in their dead stumps one or both of these grubs will be found in profusion and of all sizes.

CHERRY. TRUNK.

72. SPOTTED HORN-BUG, *Dynastes Tityus*, Linn. (Coleoptera. Scarabæidæ.)

In old decaying trees, a very large grub, like those of the last named species, producing a beetle two inches in length, of a shining pale olive color, its wing covers with round black spots or dots, the males having the middle of the thorax prolonged forwards in a long black horn which is hairy along its under side and commonly notched at its tip, as if to receive the sharp point of another similar horn which curves upwards from the crown of the head; two other horns between these, short and sharp pointed, one upon each side. This large beetle is frequently met with at the south and I have specimens of it from Pennsylvania, but know not of its ever being found in New-York. Mr. Say mentions possessing a specimen having the wing covers chestnut brown and without spots, and I have a female in which the whole of the thorax is black. But probably the most remarkable specimen which has ever been discovered was captured west of Arkansas by Rev. R. M. Loughridge and presented to the entomological cabinet of the N. Y. State Agric. Society. This is a male having the left wing cover black and without spots, whilst the right wing cover and thorax is pale olive yellow.

73. DOG-DAY CICADA, *Cicada tibicen*, Linn. (Homoptera. Cicadidæ.)

In August and September, wounding the small limbs to deposit its eggs therein, a large black fly with four clear glassy wings having a green rib, its head and thorax with olive green spots and marks, and its under side coated with a white meal-like powder. Length 1.60 to 2.00. The *pruinosa*, Say, is this same species, with the white mealy powder not rubbed off as it frequently is in old specimens. The *canicularis*, Harris, are merely small sized individuals of the *pruinosa*. The valves at the base of the abdomen in the males vary in their length both in large and small individuals, and therefore furnish no valid mark, as Dr. Harris supposed, whereby his species can be distinguished. The specimens found in the State of New-York are of the smaller size, this being the northern limit of the geographical range of this species. It extends from hence south to Brazil. In Surinam, according to Madam Merian, it is most common in the coffee plantations, the trees of which are sometimes killed by the wounds which the female makes in the limbs to deposit her eggs. With us it appears to resort to the maple more than any other tree, and in forests and frequently in the trees around our dwellings the loud shrill note of the male is heard every clear sunshiny day throughout dog-days. See Harris's Treatise, p. 190.

74. CHERRY BARK-LOUSE, *Lecanium Cerasifex*, new species. (Homoptera Coccidæ.)

In June, adhering to the bark upon the under side of the limbs of the wild black cherry, a hemispherical shell nearly the size and shape of a half pea, of a black color more or less mottled with pale dull yellow dots, covering a mass of minute eggs the lice from which spread over the bark and subsist upon its juices. I find no bark-louse indicated by authors as occurring upon the cherry in Europe. We in this country have two insects of this family infesting trees of this kind, the one now mentioned and the following.

75. CHERRY SCALE INSECT, *Aspidiotus Cerasi*, new species. (Homoptera. Coccidæ.)

In winter, on the bark of the choke cherry, little roundish white wax-like blisters, scarcely perceptible to the naked eye, containing beneath them in an open cavity a cluster of minute dull red or resin-like eggs. The history and habits of this species will be analogous to that of the Apple bark-louse, No. 15.

AFFECTING THE LEAVES.

76. MAY BEETLE, *Lachnosterna fusca*, Frohlich. (Coleoptera. Melolonthidæ.)

About the middle of May gathering by night upon the trees and eating the leaves, sometimes in such numbers as to wholly strip the foliage from the choicer varieties; a thick-bodied chestnut-brown or black beetle nearly an inch long, its legs of a lighter tawny yellow color and its breast coated with pale yellowish hairs.

The larva of this insect lives under ground and is most injurious to meadows and pastures. It has been very destructive the present year in some parts of our State, and enquiries have been addressed to me for information respecting it and the best remedies for it. An article in reply to these enquiries is published in the Genesee Farmer for August of the present year (vol. xviii, p. 249), the substance of which may here be repeated with some additions, as this is one of our most pernicious insects, and the measures for subduing it which I have to suggest are regarded as important.

This insect is commonly called the May bug, though the name May beetle will be a more definite and correct designation for it. The custom of calling almost all insects "bugs," is often denounced as being an Americanism; but this, like many others of these reputed Americanisms we obtained from our father-land. Thus the cockchaffer, the European analogue of this insect, we see is termed the May *bug* in the English translation of Kollar's Treatise—a clear evidence that we have obtained the name which we give to our insect from England. And in several other instances, the name *bug* will be met with in British publications, applied to beetles. Still, every person intelligent upon this subject is aware it will be an improvement in our language to give the name *beetle* to all hard, crustaceous-coated insects, which belong to the order COLEOPTERA, and restrict the name *bug* to the order HEMIPTERA, or those flat-backed insects which emit the same disgusting scent as the well-known bed-bug.

This insect is also frequently termed "horn-bug," being confounded with a larger, perfectly smooth and more flattened beetle, (No. 6, *Lucanus Capreolus*, Linn.,) which comes out later in the season. It is thus called more particularly, when, like the true horn-bug, it flies in at the open windows of our dwellings upon warm evenings, which both of them frequently do, to the great annoyance and even terror of the female portion of the household. Neither of these insects, however, can harm our persons; and when they intrude into my room in this manner, I find the quickest way to dispose of the pests, is with my fingers to hold their heads in the candle a moment or two, and then toss them out the window.

The name "field grub" has also been given to the larva of this insect in some neighborhoods where its destructiveness has brought it into notice and it was not known that it subsequently turned into a beetle.

As this is one of our most important noxious insects and will be frequently mentioned in the agricultural publications of this country, it is a matter of no small moment that its scientific name be correctly ascertained and well settled. Some confusion at present exists upon this point, among different writers. This discrepancy has chiefly arisen from a most disingenuous statement made by Dr. Harris, in both editions of his Treatise, page 28 and 26, where he says the genus *Phyllophaga* was "proposed by me in 1826. Dejean subsequently called this genus *Ancylonycha.*" Now the number of the Massachusetts Agricultural Repository in which Dr. Harris's essay appears (vol x, pages 1—12) bears the date of July 1827! and the name *Phyllophaga* is there merely suggested for this insect and its kindred, without any statement of the marks by which the group thus designated can be recognized. In this same year (1827) also, a distinguished British entomologist, Rev. F. W. Hope, published the first part of his Coleopterist's Manual, in which this same group is distinctly set apart and clearly characterized, and the name *Lachno-sterna* (i. e. hairy-breasted) is given it. This name, therefore, is evidently the one which the established rules of scientific nomenclature will give to the genus to which our insect belongs. Dejean's name *Ancylonycha* mentioned above by Dr. Harris, not having been proposed until several years later.

This insect has hitherto been generally entered under the specific name *quercina*, but Dr. LeConte has recently ascertained that nearly ten years before Weber bestowed this name upon it, Frohlich, a German naturalist, had in the year 1792 described it under the name *fusca.*

We thus reach the conclusion that *Lachnosterna fusca*, a term meaning blackish hairy breast, is the correct technical name of our common May beetle, which has so often hitherto been called *Phyllophaga quercina* in our agricultural periodicals.

The May beetle is a glossy thick-bodied insect, 0.80 to 0.90 long and about half as broad. It varies in color from chestnut-brown to black, and this difference of color does not appear to be owing to age, for it is found in newly hatched beetles before they have come forth from the ground. The head is commonly darker colored than the thorax, is closely punctured, and its anterior edge is thin and turned upward, with a concavity but not an angular notch in its middle. The feelers and antennæ are somewhat paler yellow than the legs, which are polished tawny yellow. The punctures upon the thorax are coarse and farther apart than on the head. The wing covers though glossy and shining are rough from being covered with shallow indented points the edges of which are wrinkled, and running lengthwise upon each wing cover is three or four raised straight lines. The breast is covered with glossy fine yellowish gray hairs.

This species presents several varieties. Commonly the thorax is a little narrower than the wing covers, whereby the general shape approaches to that of an egg with its small end forward. But sometimes the thorax is broader equaling the width of the wing covers and giving the individual a form nearly cylindrical. The sides of the thorax are regularly rounded, but sometimes a specimen may be found having the lateral margin slightly angular in the middle. Sometimes the punctures upon the thorax or those upon the wing covers are larger and more distinct than usual. By different authors several distinct species have heretofore been made out of these varieties of this insect.

In its larva state it is a thick soft white grub with a brownish head and with the hind part of its body curved downwards and more or less forward under its breast. It is several years in attaining its growth, so that grubs of different sizes will be found in the ground at the same time. When full grown it is almost as thick as the little finger. These grubs feed upon the roots of grass and other plants, which they cut off a short distance beneath the surface; and when they are numerous they advance under ground like an army, severing the turf as smoothly as though it were cut with a spade, so that it can be raised up in large sheets and folded over or rolled together like a carpet. Often from a dozen to twenty grubs will be exposed in every square foot when the turf is thus raised. Large patches of this kind will occur in the middle of a meadow or pasture, every blade of the grass being brown and dead.

Early in spring, in spading or plowing the ground, these beetles are frequently exhumed, or sometimes in turning over a large stone one of them will be found beneath, lying in a smooth cavity or little round hollow in the dirt, like a chicken in its shell. This cavity or cell is formed by the grub in the preceding autumn. Turning itself around and around, it presses upon and compacts the dirt and moulds it into this cell for its winter residence; and in this cell it changes first to a pupa, in which the legs and wing-cases of the insect are seen in their rudimentary state, and afterwards to a beetle, such as we have above described. This beetle lies dormant in its cell until the warmth of the incoming summer penetrates the ground sufficiently to awaken it into activity. It then breaks from its prison and works its way out of the ground.

These beetles begin to make their appearance each year about the first of May, and become most numerous in the middle of that month. They are sluggish, inactive, and seemingly stupid in their movements. They repose during the day time, hid in the grass, or any other covert which they find. At dusk they awake and fly about slowly, and with a humming noise, hitting among the leaves of the trees and clinging thereto, and feeding upon them. They are most fond of the leaves of the cherry and plum, which trees they every year injure more or less, and occasionally they congregate in such numbers as to wholly strip them of their foliage, destroying all hopes of any fruit from them that season. An instance of this kind was communicated to me four years since by Milo Ingalsbe, Esq., of South Hartford, at that time President of the Agricultural Society of this (Washington) county. He had seventy plum trees and a number of cherry trees of the choicest varieties, which never gave fairer promise of an abundant yield of fruit than at that time. But a swarm of these May beetles suddenly gathered upon the trees, many of them being then splendidly in bloom, and in two nights, the 15th and 16th of May, wholly stripped them of their foliage, so that many of them were as naked as in winter. With their humming notes, these beetles were flying about the trees every evening until about ten o'clock, when they would settle in clusters of eight, ten, twenty or more, and would thus remain until daylight, when they would tumble down from the trees, flying but little, however, and hiding themselves wherever convenient to stay through the day. These observations are important, showing that between midnight and daylight is the best time for spreading sheets beneath the trees to shake and beat these insects into them. In a subsequent letter, dated June 29th, Mr. I. stated that these beetles had then disappeared from all his trees except an Ox-heart cherry, on which about a dozen were found, this being the choicest variety among his cherry trees—indicating that though seemingly such stupid creatures, they are good connoiseurs in selecting their food. And among his plums, it was the Washington, Jefferson, Lawrence and others of his best kinds which had been attacked with the greatest avidity.

Apple trees, which were standing alternately with his plum trees, were not in the least molested. Mr. I. has recently informed me that his trees have never been reinvaded by these beetles since that time.

These insects are numerous all over our country. In my own neighborhood they have been common every year, I think, since I first became acquainted with them, more than twenty-five years ago; yet I have here never known the trees to be stripped of their foliage by them, or the turf to be severed by their larvæ, although two or three instances of the latter have been related to me as having occurred in this town, and I have several times heard of the same phenomenon in other places. It appears to be a most singular and remarkable circumstance in the economy of these insects, that, while it is their ordinary habit to live dispersed and apart from each other, they at times become gregarious, both in their larva and their perfect state, multitudes of them assembling together in a flock, and by their conjoined labors utterly devastating what they attack. Some other insects, however, show this same habit. It is only occasionally that the migratory locust of the east, so renowned in story, congregates together in swarms and flies off to a distance. And instances have occurred in which the common red-legged grasshopper, which is scattered about the fields of our own country, has done the same in years when it has been unusually abundant.

The history of our May beetle and its transformations have never been fully observed, but everything known respecting it concurs to show that it is exactly analogous to the cockchaffer or May bug of Europe, (*Polyphylla Melolontha*, Linn.,) and occupies the place of that species upon this continent. The grubs of that insect are about five years in obtaining their growth. The beetles pair soon after they come from the ground, and the male lives but a few days. The female crawls back into the ground and there drops her eggs, which are nearly a hundred in number, after which she again emerges, and being now decrepit with age, she feeds but little and dies in a short time.

Among the natural destroyers of our May beetle is the skunk, whose food appears to consist of these insects almost entirely, during the short period of their existence. Some cats will also eat them, though I suppose it to be more for sport than food that grimalkin is frequently seen at twilight, stealthily creeping through the grass of the door-yard, and springing upon these beetles as they crawl therefrom to take wing. Our domestic fowls are also very fond of the grubs. But of all the destroyers of these insects, no other animal can vie with the crow, which frequently follows the track of the plow to feed upon the grubs of the May beetle which are turned up thereby.

With regard to remedies we may observe, that in Europe the experience of centuries has failed to discover any efficient measure for destroying a similar insect during the larva period of its existence. And concealed in the ground as these grubs are, it is not probable that any substance can be applied to the soil of sufficient power to kill them without destroying also whatever vegetation is there growing. But where these grubs are so numerous as to sever the roots of the grass and pare the turf, I think there is a measure which may readily be resorted to whereby they may be exterminated. I would recommend the placing of a temporary fence around that part of the meadow or pasture which is so thronged with these grubs, and enclosing a number of swine therein, thus for a while converting the patch into a hog pasture. The propensity of these animals for rooting and tearing up the turf, we are all aware, is for the very purpose of coming at and feeding upon the grubs and worms which are lurking therein; and who knows but this rooting propensity, which has all along been complained of as being the most troublesome and vicious habit which belongs to swine, may after all turn out to be the most valuable and necessary to us of any of the habits with which they are endowed? At all events, it is one of man's greatest achievements to so observe and study the habits and instincts of the lower animals, as to devise ways whereby those habits and instincts, instead of being exerted to his injury, are brought into his service and made to work for his benefit. Therefore do not let us "lords of creation" allow these vile field grubs to rob us of two or three acres of grass without obliging them to give back to us an equivalent for it. Let us have the value of that grass returned to us in the increased size and thriftiness of our swine. I cannot but think these animals, confined upon a spot so overstocked with grubs, would in a short time ferret out and devour every one of them, leaving the soil cleansed, mellowed, manured, and well prepared for being immediately laid down to grass again, or for receiving any rotation of crops for which the proprietor may deem the spot best adapted. It should be observed that when cold weather approaches, these worms sink themselves deep into the ground so as to be beyond the reach of frost during the winter, and return back to near the surface again when spring returns; so that when they are severing the roots of grass there will probably be none deeper than hogs are accustomed to root. It will be interesting to know how long a given number of swine will be occupied in cleansing an acre of ground containing from twelve to twenty of these grubs in every square foot. And I earnestly hope those who have lands which are devastated in the manner spoken of, will try the experiment which I have now proposed, and will make the result known to the public, whether it be successful or otherwise.

When these grubs have completed their growth, and come abroad in their perfect state, another opportunity is presented for destroying them and preventing their future increase. Every year when the middle of May is approaching, cherry and plum trees should be inspected each evening, particularly our choicest varieties of these trees, to ascertain if the May-beetles are collecting in numbers upon them; and if they are, they should immediately be shaken off upon sheets spread beneath the trees, and emptied into bags or covered pails, and should be killed by immersing them in boiling water, or pouring this upon them; after which they may be fed to the swine and poultry. Many years ago a writer in the New-York Evening Post stated that trees could in this manner be entirely freed from these beetles in a very few evenings. Trees from which two pailsful were collected the first evening furnished a much less number upon each succeeding night, until the fifth, when only two beetles could be found upon them.

The ROSE-BUG, No. 50, a buff yellow beetle smaller than the preceding, eats the leaves, the last of June.

CHERRY. LEAVES.

77. VIOLACEOUS FLEA-BEETLE, *Crepidodera violacea*, Melsheimer. (Coleoptera. Chrysomelidæ.)

From the middle of May till August or later, eating numerous small holes in the tender new leaves at the ends of the limbs, a brilliant coppery, violet or greenish black flea-beetle, 0.10 long, its under side black, its attennæ and legs dull pale yellow with the hind thighs black. It sometimes merely gnaws a little round hollow in the under side of the leaf, leaving the thin transparent skin on the upper side of the leaf entire.

LARGE YELLOW BUTTERFLY. The larva occurs on the cherry the same as on the apple. See No. 36.

78. GLAUCOUS BUTTERFLY, *Papilio glaucus*, Linn. (Lepidoptera. Papilionidæ.)

I have not met with this butterfly in the State of New-York, but a larva identical with that of this species as figured by Abbot, I have repeatedly noticed upon the garden cherry and also on the oak and ash, in August, resting day after day upon a thin cobweb spun over the upper side of a particular leaf. The larva is like that of the large yellow butterfly, No. 36, with several blue or violet dots superadded, namely, one above each of the eye-like spots, four in a transverse row forward of the yellow band, a similar row on each of the three rings forward of the last, and a row lengthwise low down upon each side. The butterfly is black, 4.75 to 5.50 across its wings, and may be recognized by a row of small oval spots of a pale yellow or white color extending across the fore wings near their hind edge.

79. PURBLIND SPHINX, *Smerinthus myops*, Smith and Abbot. (Lepidoptera. Sphingidæ.)

In August, a large cylindrical apple-green worm with a curved horn at the end of its back, two rows of rust red spots, and along each side six oblique yellowish streaks; passing the winter under ground, and in July changing to a moth which may be distinguished by its hind wings, which are dark snuff brown, their inner half light ochre yellow inclosing a large round black spot having a pale blue centre. Width 2.50. Rare. See Silliman's Journal, vol. xxxvi, p. 291.

CHERRY. LEAVES.

The CECROPIA EMPEROR MOTH, No. 33. Two young worms which I placed on a garden cherry fed freely thereon, remaining till they were full grown, and I doubt not this species sometimes occurs naturally upon this tree.

80. PROMETHEA EMPEROR MOTH, *Attacus Promethea*, Drury. (Lepidoptera. Bombycidæ.)

In August, a large cylindrical, or when at rest a tapering pale greenish-yellow worm coated with a white bloom except at each end, with six rows of black dots or small prickles, the two upper ones on the second or third rings larger, resembling little horns of a bright red color like sealing wax, and on top of the ring forward of the last a single bright sulphur yellow protuberance; forming its cocoon inside of a rolled leaf the stem of which is tied to the limb with silken threads; the moth coming from it the last of June, its wings measuring from 3.60 to 4.40, sooty black, in the female brownish red, bordered behind with drab gray in which is a wavy black line having forward of it on the hind wings a row of round black spots, in the female deep red, the inner ones more or less united.

As Dr. Harris (Treatise, page 300) mentions the cocoons of this insect as sometimes occurring on the cherry it will be inferred that it feeds upon the leaves of this tree. And I introduce this species here, to observe that I have reason to think the statements which have hitherto been made respecting the vegetation on which this insect subsists, are perhaps erroneous, writers having probably taken it for granted that it fed upon the trees on which they have found its cocoons. This is a subject of more than ordinary importance, since it has been shown upon a preceding page that this moth and the Cecropia are most intimately related to the Arrindy silk worm; and further experiments should be instituted to ascertain whether the silk of these moths of our own country does not possess similar durability and strength with that of the East India worm, and whether these insects are not susceptible of being turned to a valuable account.

All the statements hitherto published point to the sassafras as the tree on which the larvæ of the Promethea moth chiefly subsist. Now for fifteen years past a sassafras has been growing in my yard without one of these worms ever appearing upon it; whilst upon an ash tree standing beside this sassafras and not three feet distant from it there has repeatedly been a family of these worms. Certainly if the sassafras were the favorite food of this species some of these worms would have been placed upon it. They have also occurred upon ash trees in other parts of my grounds, and upon no other tree have I ever met with them. Last year on the 18th of July a dozen young worms were found in a cluster upon the under side of a leaf of the ash tree above alluded to, and upon an adjacent leaf of the same stalk were the shells of the eggs from which these worms had come, resembling little cups or hemispheres of clear glass. The eggs were in contact with each other on the under surface of the leaf, and this leaf had been partly consumed by the worms when they first came from their shells. I continued to notice them daily for about a week, when they all disappeared, probably mounting high into the tree, and I could discover no traces of them afterwards. Upon the fall of the leaves in autumn I was disappointed to find no cocoons upon this tree; but upon a lilac growing against the side of the house four rods distant two dozen cocoons occurred. The worms which formed these cocoons could not have fed upon the lilac without being discovered, and I could not avoid the conclusion that they had been reared upon the ash tree, and when fully grown had migrated to this bush, though in doing so they passed several other lilac bushes, and selected this, perhaps, because growing against the side of the house it would be less apt to be visited by birds than those standing in the open yard. But this precaution did not save them. The last winter being unusually long and severe, our winter birds were obliged to forage more assiduously than usual, and before spring every one of these cocoons were perforated and its inmate destroyed. In other instances I have noticed these worms remaining till they were mature, upon small sprouts of the ash where they could be observed daily. From all these facts I am confident the ash is their favorite food. But when ready to spin their cocoons it is too laborious a task for them with their silken threads to tie the long leaf stalks of this tree to the limbs from which they grow, and I have very seldom known a cocoon to be placed upon this tree.

Having finished feeding, the worms invariably repair to other trees having tough leathery leaves which will form a thick substantial mantle around the cocoon, and having short stems that can readily be tied to the twigs from which they grow. We cannot but admire the intelligence which they manifest in this procedure. Authors mention the sassafras, cherry, poplar, Azalea, Cephalanthus, snow-drop (*Halesia*) and bay, as the trees and shrubs on which the cocoons occur; but in this district it selects the lilac in preference to any of these. Few winters pass but that some of these cocoons may be seen on the lilacs in all our yards, and sometimes fifty or more will be observed upon a single bush. In the city of Albany they are equally as common upon the lilacs as in the surrounding country. But as the other insects of this family feed upon several different trees and shrubs, it is not probable that this is confined to one kind of food. Being found, however, in Eastern New-York, so uniformly if not exclusively upon the ash, and its cocoons upon the lilac, it is remarkable that neither of these trees has ever been mentioned by writers, in connection with this most interesting and beautiful moth.

81. IO EMPEROR MOTH, *Saturnia Io*, Fab. (Lepidoptera. Bombycidæ.)

In August, a thick apple green worm, 2.50 long, covered with clusters of prickles having black tips and stinging like nettles if touched, and along each side an orange or brick red stripe freckled with white dots and edged on its lower side by a white stripe; forming a cocoon on the ground under dead leaves; the moth appearing in June, its hind wings bright yellow, their inner margin purplish red and on their middle a large black eye-like spot having a pale blue centre in which is a white streak; the fore wings yellow in the male, purplish brown in the female. Width 2.70 to 3.50. I have met with this on the wild black cherry and on the thorn. From six to nine worms often occur upon the same tree. They commonly eat all the leaves from the end of particular limbs, leaving only a short stump of the leaf stalk. See Harris's Treatise, p. 304.

82. MISIPPUS BUTTERFLY, *Limenitus Misippus*, Fab. (Lepidoptera, Nymphalidæ.)

In June and July, a thick bodied worm 1.75 long, olive green varied with white, the second ring humped and with two long blackish prickly horns, a row of small white prickly warts along each side of the back, and the head white and covered with small prickles; its pupa hanging with its head downwards, on the under side of a limb or leaf, in a week or ten days giving out a butterfly having bright tawny orange wings with black veins and margins and a narrow black band across the middle of the hind pair, the black border having a single row of white dots. Width 2.75 to 3.40. Abbot says the larva feeds on different species of cherry, but it is much oftener met with on willows, and I have also found it on poplar.

83. CLYTON BUTTERFLY, *Apatura Clyton*, Boisduval. (Lepidoptera. Nymphalidæ.)

A worm nearly 1.05 long and as thick as a goose quill, thickest in the middle, pale green with four light greenish yellow stripes, the top of its head having two yellow spines with branching prickles; its pupa hanging from the under side of a limb with its head downwards; the butterfly with blackish brown wings, tawny orange on the basal half of the fore pair, beyond which is two rows of small olive yellow spots and near the hind edge a narrow yellowish band broken towards its inner end. Width 2.20. I have never met with this in the State of New-York. It occurs through the southern States on the cherry and other trees of the same family.

84. AMERICAN LAPPET-MOTH, *Gastropacha Americana*, Harris. (Lepidoptera. Bombycidæ.)

The latter part of summer, a cylindrical worm when feeding by night, but by day broad and flat, pressed to the limb and resembling a tumor of the bark, 2.50 long, ash-gray varied with whitish spots and having two transverse velvety red streaks anteriorly; its pupa in a cocoon also resembling a slight swelling upon the limb, of the same colors with the bark; the moth appearing in May, its wings deeply notched along their hind and inner margins, reddish brown, both pairs crossed by a broad whitish band which has a wavy dark reddish line upon each side. Width 1.50 to 1.90. See Harris's Treatise, p. 293. [NOTE.—This is the same with No. 30. The repetition was not discovered till it was in type, too far to cancel the error,]

CHERRY. LEAVES.

85. Hag moth, *Limacodes pithecium*, Smith and Abbot. (Lepidoptera. Arctiidæ.)

In August and September, a flattened dark brown singular looking worm of an oblong and nearly square form, the sides of its body prolonged outwards into eleven tooth-like processes, the three middle ones of which are longer with their ends curved backward, growing to nearly an inch in length, its pupa state passed in a small cocoon fastened to a limb; the moth dusky brown, its fore wings varied with pale yellowish brown, and crossed by a narrow wavy curved band of this color, edged on its hind side near the outer margin with dark brown, and having near the centre a light brown spot. Width 0.95 to 1.25. See Harris's Treatise, p. 324.

86. Dry leaf measure-worm, *Geometra? siccifolia*, new species. (Lepidoptera. Geometridæ.)

A measure worm in many respects like the preceding, but more narrow and flattened and having a marked resemblance to a dry withered leaf or the brown scraggy fragment of a dead twig, may frequently be met with some years, in August and September, most commonly upon choke cherry bushes. It is 0.80 long and a dull dark umber brown color, sometimes of a paler yellowish shade, and with a blackish streak along the middle of its back. The three middle segments are nearly double the width of the others, their sides being prolonged obliquely forwards and upwards in thin flat triangular projections having their tips blunt or slightly notched, and commonly ending in two little sharp teeth. The next segment back of these is also slightly prolonged outwards. On the top of the segment next to the last are two little horns projecting upward. Adhering to a twig with its four hind feet, it remains motionless with its body slightly bent and turned upward, and if knocked to the ground it lies perfectly still. No one from its appearance, would suspect it to be anything possessed of life. The latter part of September it draws two or three leaves together tieing them with silken threads, and spins its cocoon within them; but I have not yet succeeded in obtaining the moth from these cocoons.

CHERRY. LEAVES.

The ROSACEAN TORTRIX, No. 46, is a common worm upon the cherry

87. CHERRY-EATING TORTRIX, *Lozotænia Cerasivorana*, new species. (Lepidoptera. Tortricidæ.) Plate ii, fig. 3.

In July, tieing the leaves together with silken threads; when numerous, living in societies and forming a large nest, drawing all the twigs and leaves of a particular limb together; oftenest seen on the choke cherry, but occurring also on the garden cherry; an ochre yellow worm with the head, neck, hind end and feet black, and a few fine hairs from smooth shining dots; forming its pupa in the same nest; the moth broad and flat when at rest, the outer edge of its fore wings being strongly rounded towards the base and straight from the middle to the tip, these wings with irregular wavy bands alternately of bright ochre yellow and pale leaden blue, the yellow bands often varied with rusty or blackish atoms forming darker spots, the most conspicuous one of which is placed on the outer margin near the tip, and from this spot a broader ochre yellow band extends towards the hind margin forward of its middle and curves thence to the inner angle; hind wings and all beneath pale ochre yellow. Width 0.75 to 1.10. Like others of this group this moth varies greatly, the marks on its fore wings being confused and indistinct or wholly obliterated in old rubbed individuals. It may always be known, however, from the other moths related to it, by its bright yellow color, in connection with its size and the shape of its fore wings. None of the described insects of this genus appear to have hind wings of so pure yellow without any smoky or dusky shade.

88. FALL WEB WORM, *Hyphantria textor*, Harris. (Lepidoptera. Arctiidæ.)

In August and the fore-part of September, forming a large thin cobweb-like nest on the end of a limb and eating all the leaves in and around it; smallish caterpillars living together in a society, their color pale yellow, with a broad black or blackish stripe upon the back and another beneath, thinly clothed with whitish hairs growing from smooth orange yellow and black dots, the head and feet black; the worms of the same nest varying greatly in size and colors; growing to about an inch in length and then dispersing and spinning their cocoons in crevices of the bark and similar sheltered situations; the moth appearing the fore part of the following summer, a milk white miller without any spots or dots on its wings, its fore thighs tawny yellow in front and the anterior feet alternated with black and white on their fore side. Width 1.25 to 1.35. This is quite common some years, and occurs upon the ash, willow, and several other trees. See Harris's Treatise, p. 276.

A Brazilian moth very similar to that of our Fall web worm, has been sent me from Bahia, by my friend A. de Lacerda. In this the basal part of the outer edge of the fore wings and the feet are blackish, and the four anterior shanks are orange yellow on their outer side with a blackish spot on their base and another on their middle. Its expanded wings measure 1.50. Its pupa is white with the abdomen flesh colored and is beautifully variegated with symmetrical black stripes and spots, from which circumstance, as I meet with no description of this species, I have named it in my collection, *Hyphantria pictipupa* or the Painted puppet.

89. YELLOW-NECKED ERMINE MOTH, *Hyphantria collaris*, new species.

A moth closely related to the preceding and doubtless possessing the same habits, has been sent me from Mississippi, and probably occurs throughout the southern states. It is milk white and glossy, its head, neck, base of the outer edge of the fore wings and the anterior hips are pale ochre yellow, and its feet pale brown. Width 1.35.

90. DOTTED ERMINE MOTH, *Hyphantria punctata*, new species.

A worm similar to that of the Fall web worm and possessing the same habits, producing in June a milk white miller having a continuous black stripe on the fore side of its anterior feet and shanks, their thighs and hips being yellow in front, and the fore wings having a black central dot, and in the males a row of small blackish spots extending from the middle of the inner margin to the tip. Width 1.65 to 2.00. This is frequently met with in our district, though much less common than the Fall web worm.

CHERRY. LEAVES.

91. Spotted ermine moth, *Hyphantria cunea*, Drury.

Caterpillars similar to those of the Fall web worm, and like it forming a large cobweb-like nest on the ends of the limbs of the wild cherry, willow and other trees in autumn. The moth a milk white miller with its anterior feet black on their fore side and alternated with black and white on their hind side. Its anterior shanks are black in front and the thighs and hips orange yellow. In the male the fore wings have numerous small black spots and dots which do not appear in the other sex. Width 1.30 to 1.60. The males vary greatly in the number of their spots, and frequently there is a curved black band upon the middle of their fore wings cut across only by the white veins. This species, named in allusion to its fore wings *punctatissima* or many dotted, by Smith and Abbot, and *cunea* or wedge spotted, by Drury, was described by the latter from specimens captured in the vicinity of New-York city, and S. Calverley, Esq., of Brooklyn, to whom I am indebted for a suite of specimens showing its several varieties, informs me it is quite a common insect there. But I have no knowledge of its occurrence anywhere north or west of the Highlands.

The Apple tree caterpillar, No. 28,
Vaporer moth, No. 32,
Canker worm, No. 38,
Apple Tortrix, No. 40, and
Palmer worm, No. 42, may all be found feeding upon the leaves of the cherry.

92. Cherry slug worm, *Selandria Cerasi*, Peck. (Hymenoptera. Tenthredinidæ.)

In June and July eating the upper surface of the leaves and leaving the veins and skin of the under side entire; small shining slimy slug worms of an olive brown and blackish color, dull yellow beneath, tapering and swelled anteriorly, resembling young tadpoles; several often feeding upon one leaf; maturing in four weeks and then burying themselves under ground through the winter; changing finally to a small glossy black fly with four transparent wings tinged with smoky which forms a dusky cloud across the middle of the fore pair, its four anterior legs and the knees of the hind pair dirty yellow or clay colored, their thighs blackish. Length 0.22. See Harris's Treatise, p. 419.

93. CHERRY ABIA, *Abia Cerasi*, new species. (Hymenoptera. Tenthredinidæ.)

I only know this and the following species from specimens bred from cocoons found attached to the limbs of the wild black cherry, which is a sufficient evidence that their larvæ subsist upon the leaves of this tree. Like other larvæ of the same genera, they will be twenty-footed worms, having two pairs of pro-legs more than the usual number, and they eat the edges of the leaves. The cocoons of both these insects are cylindrical with rounded ends, and are of a tough firm texture, resembling coarse brown paper. Those of the cherry Abia are 0.80 long by 0.38 in diameter. Two of these cocoons were met with last March, upon a low bush within three feet of the ground. One of them had been perforated by birds and its inmate destroyed; the other on being brought into a warm room hatched within a fortnight, indicating that with the first warm days of spring these flies come abroad. They cut off one end of the cocoon smoothly, to make their exit from it, the severed end resembling a little lid, some of the loose threads upon the outer surface of the cocoon forming a hinge whereby this lid can be opened and shut. The fly is black with the abdomen and thighs blue black and the feet and tips of the shanks pale yellow. Its thorax is thinly covered with pale grayish yellow hairs, and its wings are transparent, smoky yellowish, with black veins, those on the basal third pale yellow. Length 0.60, to the tip of the wings 0.80; width 1.35.

The species of this genus are very few, and little is known of their habits. This is the first one, I believe, which has been found in this country. It resembles a *Cimbex*, the antennæ being short, with a round knob at their ends shaped like an egg with its large end outwards, and in the specimen before me there are four joints to this knob, and four in the stem which precedes it, this being one joint more than the normal number in this genus.

CHERRY. LEAVES

94. BLACK-CALFED SAW-FLY, *Nematus suratus*, new species. (Hymenoptera. Tenthredinidæ.)

This comes from a cocoon 0.30 in lengtn by 0.14 in diameter. The fly eats off the end of its cocoon to make its exit therefrom. It was met with at the same time with the preceding species, and was a week later in hatching. The fly is black with four transparent slightly smoky wings, its mouth lurid white as is also a cloud-like spot on the shoulders, the edges of the abdominal segments, and the legs, the four anterior thighs being black upon their under sides and the hind pair wholly black except at their bases. Length 0.25, to the tip of the wings 0.30.

A surprising degree of intelligence was manifested by this insect, in the situation which it selected for its cocoon. Upon a small limb growing perpendicularly upward the moth of an apple tree caterpillar had placed its belt of eggs, coated over with gum in the usual manner, and immediately above this a small tender leaf was growing. The worm spun its cocoon between this belt of eggs and the leaf above it. The frosts of autumn subsequently wilted this leaf and the rains saturating it weighed it downward, causing it to adhere like a wet cloth to the belt of eggs, the gum upon which afterwards drying glued the leaf securely in this position. And thus the stem of the leaf came to form a band or loop over the cocoon, holding it securely in its place. It is truly wonderful how the worm which formed this little thimble-like cocoon could have known that this spot was so well adapted for its wants. Had it previously crawled over these caterpillar's eggs when they were wet, and thus discovered that their gummy covering then became soft and adhesive? And had it the intelligence to foresee that the leaf growing immediately above them would in a short time wither and lop downwards and become firmly glued to the surface of this gum? It would so appear, from the fact of its placing its cocoon crosswise of the twig, so that it might become bound to it in this manner, instead of attaching it lengthwise as insects generally place their cocoons, and from the further fact that it imbedded the lower end of the leaf stalk in the outer surface of its cocoon, evidently for the purpose of holding the leaf steadily in such a position that when it wilted it must lop directly downward and not sway off to one side. This curious specimen may be seen in the Entomological department of the Museum of the State Agricultural Society.

AFFECTING THE FRUIT.

The PLUM WEEVIL or CURCULIO, No. 70, a small white worm occasionally found in the interior of cherries, is the only insect known to us as infesting this fruit.

9. THE GRAPE.—*Vitis vinifera, et al.*

AFFECTING THE ROOT.

95. GRAPE VINE BORER, *Trochilium Polistiformis*, Harris. (Lepidoptera Trochiliidæ.)

A worm resembling the Peach tree borer, No. 59, in its size and habits, producing a moth resembling a wasp, of a dark brown color marked with orange or tawny yellow, and with a bright yellow band on the base of the second ring of its abdomen, its fore wings dusky, hind ones glassy hyaline with the margins and veins black. Width 1.00 to 1.50. Found by Dr. Kron, in North Carolina, where it is exceedingly destructive to both wild and cultivated grapes. See Patent Office Report, 1854, p. 80.

AFFECTING THE STALK.

96. VINE SCALE INSECT, *Lecanium Vitis*, Linn. (Homoptera. Coccidæ.)

Appearing on the bark in June, a brown hemispherical scale from under one end of which a white cotton-like substance protrudes, more and more, till about the first of July, it becomes four times as large as the scale, and from among it minute oval yellowish-white lice, the hundredth of an inch in length, creep out and distribute themselves over the bark, to which they fix themselves and become stationary, sucking its juices. This appears from the short descriptions given by authors, and from specimens sent me by Dr. Signoret of Paris, to be the same with the European scale insect of the vine. See Kollar's Treatise, p. 155.

97. Four-spotted spittle insect, *Aphrophora 4-notata*, Say. (Homoptera. Cercopidæ.)

A spot of white froth resembling spittle, appearing upon the bark in June, containing under it a pale wingless insect which punctures the bark and sucks its juices, as does also the perfect or winged insect which occurs upon the vines the beginning of July, and is a flattened tree-hopper of a brown color, its wing covers having a blackish spot at the tip, another on the middle of the outer margin and a third at the base, with the spaces between these spots hyaline white. Length 0.30.

98. Signoret's spittle insect, *Aphrophora Signoretii*, new species.

In habits and appearance like the preceding, but without any black spots or marks, its ground color being tawny brown with dull whitish clouds, and thickly punctured with black, the wing covers having a small white spot on their inner margin near the tip and a larger one opposite this on the outer margin. Length 0.32.

This species has a whitish stripe between two blackish streaks along the middle of the head, but no distinct raised line either here or upon the front. Still, that it pertains to this genus, rather than to *Ptyelus*, is shown by its ocelli or eyelets, which are placed nearer to each other than to the eyes, and by the base of its head, which is angularly notched in the middle instead of being rounded in a regular curve, as we find it to be in both *Ptyelus* and *Lepyronia*. I regard these as the most valid characters by which to discriminate these closely related genera. Another spittle insect which I discovered common upon the pitch pines on the sand plains of Saratoga, and described in my Catalogue of Homopterous insects in the State Cabinet of Natural History, under the name of *Lepyronia Saratogensis*, was the same year described by Mr. Walker, (List of the British Museum, p. 714,) under the name *Ptyelus gelidus*, his description having issued from the press a few months subsequent to mine. Mr. Walker has, accordingly, in the supplement to his list, (page 1153), done me the justice of giving precedence to my name. I think, however, that both this species and the *parallela* of Say must be carried back to the genus *Aphrophora*, since the nearness of their ocelli removes them from *Ptyelus*, whilst the length and narrowness of their wing covers separates them from *Lepyronia*, and the angular notch in the base of their heads, and the pale stripe, slightly elevated, along the middle of the head and thorax, further separates them from the genera to which they have been referred, and approximates them to *Aphrophora*. The foreign species belonging to these genera, with which I have been most liberally supplied by Dr. Signoret, of Paris, enable me to trace the affinities of these rather anomalous insects much more accurately than it would be possible to do without such aid.

The *Cercopis quadrangularis* Say so closely resembles the European *Lepyronia coleoptrata*, that I am surprised to see it placed in any other genus.

The *Cercopis obtusa*, Say, also placed under *Ptyelus* by Mr. Walker, belongs to the genus *Clastoptera*.

The *Cercopis ignipecta* of Harris's catalogue, also supposed to be a *Ptyelus* by Mr. Walker, pertains to the genus *Monecphora*. As this name, *ignipecta*, was published more than twenty years ago and no description of this species has ever been given, I may here supply this deficiency. In size and form this insect has a marked resemblance to the *Monecphora bicincta*, Say, but is destitute of bands or spots on its upper surface. It is black, old specimens fading to brown, and on the under side the breast, the edges of the abdominal segments, the anterior knees and the hind legs are bright blood red with the tips of the feet black. Length 0.35.

AFFECTING THE LEAVES.

1. *Puncturing them and sucking their juices.*

99. Large green tree bug, *Rhaphigaster Pennsylvanicus*, Degeer. (Hemiptera. Pentatomidæ.)

A large flattened grass green bug edged all round with a light yellow line, interrupted at each joint of the abdomen by a small black spot, its antennæ black beyond the middle of their third joint, with a pale yellow band on the first half of the two last joints. Length 0.60 to 0.70. This occurs, chiefly in September, throughout the Northern States, upon hickory, willow and other trees, as well as on grape vines. Mr. Dallas has recently described it as a new species, naming it *R. Sarpinus*, List of British Museum, p. 276, and Mr. Say has also named it *hilaris*.

100. Bound tree bug, *Pentatoma ligata*, Say. (Hemiptera. Pentatomidæ).

A large grass green bug closely resembling the foregoing, but more widely edged all round, except upon its head, with pale red, and with a pale red spot upon the middle of its back, occupying the apex of the scutel, its antennæ green, the second joint dusky at its tip and the three last joints black. Length 0.55, width 0.34. Rare. Though so much like the preceding species this pertains to a different genus, being destitute of the sharp point at the base of its abdomen between the hind pair of legs which may be seen in that insect.

101. MODEST TREE BUG, *Arma modesta*, Dallas. (Hemiptera. Pentatomidæ.)

Tawny yellowish gray thickly dotted with brown punctures, the wing covers commonly red at the apex of their leathery portion, and with a brown spot at the tip of their glassy hyaline ends, the under side whitish with a row of distant black dots along the middle of the abdomen and another on each side. Length 0.40 to 0.46. This is one of our most common tree bugs and will be met with in autumn upon a number of different trees and shrubs. It has the spine-like point on the base of the under side of the abdomen very short, and the angular projection on each side of the thorax is not drawn out into a sharp point, by which characters it is readily distinguished from another species very similar to it, the spined tree bug, No. 26.

102. SINGLE STRIPED TREE HOPPER, *Thelia univittata*, Harris. (Homoptera. Membracidæ.)

A tree hopper shaped like a beech nut, with a perpendicular protuberance on the fore part of its back, more high than wide, its summit compressed and rounded, the insect of a chestnut brown color, tawny white in front and with a white stripe along the back, extending from the protuberance to the tip. Length 0.37, height 0.24. Often seen on grape vines in July and August.

The BUFFALO TREE HOPPER, No. 22, may also be noticed on grape vines every day during the latter part of summer.

103. BLACK BACKED TREE HOPPER, *Acutalis dorsalis*, Fitch. (Homoptera. Membracidæ.)

A small triangular shining tree hopper with a smooth rounded back, greenish white with a large black spot on its back, from the anterior corners of which spot a line runs off towards each eye, the upper margin of the head and the breast being also black and the wings hyaline. Length of the male 0.15, of the female 0.20. Numbers of this insect may sometimes be met with on grape vines, about the last of July, and a few stragglers remain into October. The *anticonigra* of M. Fairmaire, (Ann. Soc. Ent., 2d series, iv. p. 498,) differs from this species only in having the fore wings with coarse black cr brown veins. All of the many specimens which I have met with in the state of New-York, have the wing veins colorless. This insect and the *calva* of Say, which is slightly smaller and shining black, with the face, shanks and feet dark yellowish, the tip of the thorax and abdomen pale greenish, and the wings hyaline, are the only New-York species of *Acutalis* which I have discovered, although several others occur in Pennsylvania and farther south, and some of them are quite numerous upon the kinds of vegetation which they infest.

104. VINE LEAF HOPPER, *Erythroneura Vitis*, Harris. (Homoptera. Tettigoniidæ.)

Pale yellow with two broad blood-red bands and a third dusky one on the apex, the anterior band occupying the base of the thorax and of the wing covers and scutel, the middle one ending in a much narrower nearly square black spot situated on the middle of the outer side of the wing covers. Length 0.13. Though so small such swarms of these insects sometimes gather on the vines in August and bleed the leaves so freely that they become dry and stiff and of a yellow color, as when fading in autumn. See Harris's Treatise, p. 198.

There are numerous kinds of little leaf hoppers similar to those of the vine. Hitherto they have all been included in the genus *Typhlocyba* by authors. In consequence of their diminutive size they have been less investigated than the other insects of the order to which they pertain. The number and arrangement of the veins in their wing covers and wings, present such differences as would probably have induced authors to separate them into distinct genera, before this day, had they been of larger size and better known. The species, moreover, are so numerous, and will be so largely increased no doubt by future discoveries, that as a matter of convenience a separation among them appears to be required. The characters assigned to the genus *Typhlocyba*, by different authors, are very confused and contradictory, as they have been drawn from one or another of the species, some defining it as with, others, without ocelli, etc. I was, hence, wholly at a loss with respect to the insects which it was proper to include under this genus, several years since, when arranging and naming the New-York Homoptera in the State Cabinet of Natural History. The new genera *Erythroneura* and *Empoa* thus came to be proposed by me, for the reception of a portion of these insects. The characters on which these genera were founded, I since learn, make them the equivalents of some of the leading sections into which the genus *Typhlocyba* is divided by Burmeister, Zetterstedt, and others. These names may, therefore. remain for distinguishing those species in which the veins of the wings are less numerous and fully developed than they are in *Typhlocyba* proper. The insects in question will thus be divided as follows:

TYPHLOCYBA. Wing covers bordered on the hind part of their inner side by a submarginal vein running parallel with the exterior edge, and commonly having a closed discoidal cell also.

ERYTHRONEURA. Wing covers not bordered; their outer apical cell four sided, or with two right angles at its forward end.

EMPOA. Wing covers not bordered; their outer apical cell three sided or with a single acute angle at its forward end.

Each of these genera or sub-genera admit of further division. About ten New-York species or prominent varieties, known to me, fall under the first of these genera, thirty under the second and eighteen under the last. Several of these are very similar to and are probably identical with European species.

105. THREE-BANDED LEAF HOPPER, *Erythroneura tricincta*, Fitch

Like the preceding, but the bands narrower, the anterior one not extended upon the base of the wing covers and the middle one not widened in its middle. Length 0.13. I originally met with this in abundance upon raspberry and currant bushes. Having since found it repeatedly upon grape vines I am inclined to think it may possibly be a variety of the foregoing species. In both the color of the bands varies, being sometimes tawny red and sometimes dusky or black.

106. VINE-DESTROYING LEAF HOPPER, *Erythroneura Vitifex*, new species.

Yellowish white, the wing covers with oblique confluent blood red bands and a short oblique black line on the middle of their outer margin; thorax commonly with three red stripes, the middle one forked anteriorly and confluent with two red stripes on the crown of the head. Length 0.12. When the wing covers are closed they appear red with a cream colored spot shaped like a heart anteriorly, and on their middle a large diamond-shaped spot with a small red spot in its centre. It resembles an individual of the *comes* of Say, having the red spots so enlarged as to all run together, but the marks upon the thorax are totally different from those of that species. I have sometimes met with this leaf hopper in such numbers upon the grape vine, in September, that when the leaves were agitated, the insects taking wing resembled a shower of snow flakes. I have also reared it from pupæ found upon the leaves sucking their juices. The young begin to appear a month or two earlier than the perfect insects, and resemble them, but are smaller and destitute of wings. And their cast skins, delicate, milk white, retaining the form of the insect that has left them, may everywhere be noticed adhering to the leaves.

107. WOUNDED LEAF HOPPER, *Erythroneura vulnerata*, Fitch.

Tawny yellowish, sometimes tinged with red, the wing covers with white dots and veins and on the middle of the outer margin an oblique black streak between two cream white spots, the hind one smaller and with an oblique blood red line at its end; tips smoky blackish. Length 0.12. Common in September.

108. COQUEBERT'S OTIOCERUS, *Otiocerus Coquebertii*, Kirby. (Homoptera. Fulgoridæ.)

A slim four-winged fly of a yellowish white color with a bright carmine red stripe along each side of the body and wings, which stripe is widely forked at its hind end. Length 0.42. I have met with these delicate pretty flies from the middle of July to the end of the season, more frequently upon the wild grape vine than on any other plant or tree, but they are never so numerous as to do any perceptible injury, and are chiefly interesting to us as pertaining to a genus peculiar to the United States, and very remarkable for possessing long slender cylindrical appendages attached to the base of their antennæ, nothing analogous to which are found in any other insects. These appendages vary in their length and form in different species. They resemble a slender tapering worm, irregularly crooked, lying upon and rigidly appressed to the cheeks of the insect's face and sometimes passing over the eye. The use of these curious appendages will form an interesting subject for the investigation of some future naturalist of this country. Mr. Kirby long ago described eight species of these singular insects from specimens found in Georgia by Mr.

Abbot. To these I have recently added a ninth, and two additional species are now known to me, the characters of which may briefly be stated in this place.

109. *Otiocerus Signoretii.* Pale yellow; wing covers with a broad dusky cloud-like stripe from the base to the middle of the inner margin, and extending thence obliquely across to the outer margin at its tip, and sending a very broad branch to the tip of the inner margin; a large blackish dot anteriorly, on the inner side of the dusky stripe, situated in the middle of the subaxillary cell, and four dots on the outer side of the stripe, placed at the angles of an imaginary square, the outermost one of these dots being in the middle of the outer or costal cell; veins yellow, posteriorly red; wings whitish hyaline, their veins red; keels of the upper side of the head minutely toothed, those of the frontal and lower side edged by a slender coal black line. Length of the body 0.20; width of the spread wings 0.60. The antennæ are short, scarcely reaching to the eye, and have but one appendage of about the same length in males. This species is similar to *Reaumurii*, but the dots on the wing covers are differently placed. Two specimens from west of Arkansas, from W. S. Robertson.

110. *Otiocerus Amyotii.* Light yellow; wing covers pale sulphur yellow, with a brown stripe from the base to the middle of the inner margin and thence to the outer tip; a row of blackish dots on the hind edge alternating with the ends of the apical veins, and about six dots forward of the innermost of these, placed on the tips of the subapical and on the bases of the apical veins; three brown stripes on the thorax; an orange red stripe on each side of the head, from the eye to the forward edge below the apex. Length 0.25, to the tip of the closed wings 0.40; width of the spread wings 0.70. I have hitherto supposed this to be the *Wolfii* of Kirby, but having recently captured an individual of that species, the differences between these two insects become evident to me. The *Wolfii* possesses each of the characters above assigned to the *Amyotii*, but the orange stripe on each side of the head is more faint and runs obliquely upward to the apex of the head, where it ends in a short coal black line, exactly as stated by Mr. Kirby; and the wing covers have three distant blackish dots in a row, outside of the brown stripe, one of these dots being placed near the base of each of the discoidal cells. In both of these species the females have two long appendages to the antennæ. The insect described by Amyot and Serville, and by Spinola, under the name *Stollii*, certainly is not the *Stollii* of Kirby, which is a dark colored species like the *Degeerii;* but it is in all probability the same species which I have described above. I have met with this insect in only two instances in this State, and once in New Jersey. All the specimens were females and were found upon hickory leaves.

111. *Anotia Westwoodii.* Another genus of insects peculiar to this country and closely resembling the preceding, except that they are destitute of appendages at the base of the antennæ, was brought to light by Mr. Kirby, in connection with the *Otioceri.* Only a single species of this genus, named *Anotia*

Bonnetii, has hitherto been known. We have in the state of New-York an insect of this kind which may frequently be met with upon grass and on willows in lowland meadows, from the beginning of August till the end of the season. I have hitherto supposed this to be the *Bonnetii;* but now, when I come to compare a number of specimens with Mr. Kirby's description, it becomes plain to me that this is a distinct species, and I therefore name it in honor of the distinguished British entomologist who has furnished to the Linnæan Transactions a valuable paper upon some of the insects of this group. In all the species of *Anotia* several oblique veinlets of a blood red color appear along the outer sides of the wing covers towards their tips; but our New-York species differs from the *Bonnetti*, in that the wing covers have no tint of yellow, and none of their veinlets are black. The veins and veinlets are pallid, and for the most part are broadly margined with pale brown, which color also forms an irregular band before and another behind the middle, leaving large whitish hyaline spots in the intervals. The rib vein commonly shows three or four blackish alternations forward of its middle, and there is also a short black streak upon the middle of the inner margin. The wings are whitish hyaline with a blue iridescence, and their veins are slender and whitish with the veinlet at the apex of the outer discoidal cell robust, black, and slightly margined with brown. The thorax is pale yellow, smooth and shining, with three elevated white longitudinal lines. Length 0.15, to tip of the wings 0.26; width 0.45.

Two other species of this genus are known to me, the distinctive marks of which may here be stated. They are the same size with the preceding.

112. *Anotia Burnetii* is much nearer related to *A. Bonnetii*, the three veinlets in the disk of its wing covers being blackish, but it is readily known from the other three species by a black stripe above along the middle of the three first segments of its abdomen. It is white, its wing covers milky white and subhyaline, with faint clouds of a more dusky tinge forming about three imperfect bands. A single specimen was captured by Albert Gallatin Burnet, upon ash bushes beside Henderson river in Illinois. The insects of this genus hence appear to inhabit low humid situations, whilst those of the genus *Otiocerus*, according to my observations, all occur upon bushes growing in dry uplands.

113. *Anotia Robertsonii* is very similar to the *Burnetii*, appearing to differ only in having the tips of its antennæ and its feet blackish or dusky and the back of its abdomen white without any blackish discoloration. Two specimens sent me from west of Arkansas, by W. S. Robertson.

I here subjoin a short account of two other singular insects pertaining to this family, as I have for several years been sending specimens of them abroad with merely the name by which they are ticketed in my private collection appended to them. They are most nearly related to the *Caliscelis Bonelli* of Latreille, an Italian species very rare in collections, for a specimen of which I am indebted to Dr. Signoret of Paris. This insect is commonly made the type of a distinct tribe or sub-family by authors, it differs so prominently from all its kindred. Twenty years ago an insect possessing similar distinctive characters with the *Caliscelis* was found at Mount Pleasant in Ohio, by Mr. Foster, the comrade of Mr. Doubleday, in his entomological tour in this country. It has the head prolonged forwards and downwards in a protuberance which gives it considerable resemblance to a weevil of the genus *Bruchus*. It was hence described under the generic name *Bruchomorpha* by Mr. Newman, the species being named *oculata*. Six additional species belonging to this genus are now known to me. These have all been discovered by Mr. Robertson west of Arkansas, and some of the same insects I have gathered in Illinois and have received from correspondents there. They occur in grass and subsist on its juices. Much the most common species I name:

114. *Bruchomorpha dorsata*. This is black and shining, with a pale yellow stripe along the middle of its back from the front to the tip, its legs being also pale yellow with a dusky stripe on the thighs. Length 0.16. Mr. Robertson, has discovered individuals having the wing covers and wings fully developed, showing that it is a pupa which is described by Mr. Newman. Or it may be as Mr. Westwood suggests in a letter to me, that these insects, like some of the *Nepidæ* and other species belonging to this order, attain to puberty and perish without acquiring wings, whilst in other individuals of the same species the wings become fully developed. An individual which I captured in Illinois in October, I preserved alive in a vial more than a month, supplying it frequently with fresh grass. During that time its rudimentary wing covers did not appear to make any advance in size. And at so late a period in the season we should expect it to be grown to the full dimensions which it is its ordinary habit to attain. These facts render it highly probable that Mr. Westwood's supposition is correct. But be this as it may, those individuals whose wings are rudimentary will always be the specimens found in cabinets and from which the species will be chiefly studied, since they are so much more readily captured and show the same colors and marks which belong to the full winged individuals. Mr. Robertson informs me these insects are very shy and timid, and difficult to obtain; they leap with surprising agility, throwing themselves some eighteen inches at a single bound; and like other insects, when their wings are fully grown they become still more spry and active. Hence specimens having the wings perfect will always be comparatively rare in collections.

115. *Naso Robertsonii*. Closely related to *Bruchomorpha* is another insect in which the protuberance of the head instead of being compressed is cylindrical and abruptly enlarged at its apex into a smooth polished black knob of a spherical form, thus resembling a species of *Bruchus* with a drop of liquid pitch adhering in a globule to the end of its beak. I hence name the genus from the Latin, *naso*, having a great nose. This insect is of a dull pale yellow color, with an elevated line along the middle, its whole length, on each side of which the head and thorax have numerous coarse black punctures symmetrically arranged in rows, and there are two oblong black spots above, upon the beak, two round ones between the eyes and two smaller ones upon the scutel. The segments of the abdomen are occupied with little short black furrows running lengthwise. The wing covers are rudimentary, covering the basal half of the abdomen, and are black with a net work of irregular coarse elevated veins of a pale yellow color and an elevated dot of the same color in the centre of most of the cells. Length 0.18. Several specimens have been sent me from west of Arkansas by Mr. Robertson, and I also found it in Illinois.

116. Vine Aphis, *Aphis Vitis?* Scopoli. (Homoptera. Aphidæ.)

A plant louse is reported as very destructive to the leaves and young shoots of the grape at the south, which perhaps is the same insect which infests the vine in the southern parts of Europe, but as no description of it is given we are unable to judge whether it possesses any resemblance to the foreign species. See Patent Office Report, 1854, p. 79.

2. *Forming excrescences upon the leaves*

117. Grape leaf louse, *Pemphigus Vitifoliæ*, Fitch. (Homoptera. Aphidæ.)

Early in June, a small globular gall the size of a pea, growing upon the edges of the leaves, of a red or pale yellow color and its surface somewhat uneven and woolly, with a cavity inside, in which is a pale yellow louse of a flattened hemispherical form, with short blackish feet. Length 0.04. See Transactions, 1854, page 862.

3. *Worms eating the leaves.*

118. Vine dresser, *Chærocampa Pampinatrix*, Smith and Abbot. (Lepidoptera. Sphingidæ.)

Eating the leaves and nipping off the fruit stalks, causing the clusters when but half grown to drop to the ground; a thick cylindrical worm, tapering anteriorly, its third and fourth rings thicker and slightly humped, a short horn at the end of its back, forward of which is a row of five round rusty yellow or clay colored spots, surrounded except on their fore side by pale yellow; ground color pale green freckled with pale yellow dots, when mature changing to pale dusky olive with a dusky stripe on each side of the back, below which is a broad bluish or pink white stripe sending five branches obliquely downward and forward

Length 2.25. The pupa under leaves on the ground, in a slight cocoon, giving out the moth the following June, which hovers about flowers at twilight, like a humming bird, (as do all the other moths of this family,) and may be distinguished by its hind wings which are rusty orange yellow without any spots or border of a different color. Width 2.00 to 2.75. See Harris's Treatise, p. 149.

119. Satellite Sphinx, ***Philampelus Satellitia***, Lin. (Lepidoptera. Sphingidæ.)

In August and September a thick smooth worm resting with its head and neck drawn in, making the anterior end blunt and thickest; when young pea green with a tail standing upward and curved forward like that of a dog; when older with a glassy eye-like spot in place of the tail, and of a velvety olive brown color paler on the back, freckled anteriorly with black dots and along each side five or six large oval bright cream colored spots with the breathing pore resembling a black dot in each spot. Length 3.00. Buries itself in the ground, the moth appearing the following July, its hind wings with an olive green border having a large blackish cloud on its anterior edge, forward of which these wings are pale greenish gray with a large black spot on the middle of their inner margin. Width 4.00 to 4.75. See Silliman's Journal, vol. xxxvi, p. 299.

120. Achemon Sphinx, ***Philampelus Achemon***, Drury.

A worm like the preceding, but with the edges of the cream white spots scalloped, producing a moth having the hind wings pink red with a dusky border in which is a row of small black spots becoming faint towards the outer margin. Width 3.00 to 4.00 See Harris's Treatise, p. 248.

121. American Forester, ***Procris Americana*** Boisd. (Lepidoptera. Anthroceridæ.)

In August, standing in a row side by side on the under surface of the leaf, eating its edge and leaving only the coarse veins; little yellow worms about 0.60 long and slightly hairy with a transverse row of black spots on each ring; forming thin tough oblong oval cocoons, in crevices; the moth appearing the following July, wholly of a blue black color except the neck, which is bright orange yellow, its body ending in a broad fan-like notched tuft. Width 0.90. Much more common at the west and south than in New-York. See Harris's Treatise, p. 257.

122. EIGHT-SPOTTED FORESTER, *Alypia 8-maculata*, Fab. (Lepidoptera. Anthroceridæ.)

The last of June, a white or light blue cylindrical worm banded with black lines and on the middle of each ring a broader orange yellow band dotted with black, and posteriorly upon each side a conspicuous white spot; growing to 1.25 in length, leaving the vines about the middle of July, and inclosing themselves in slight webs upon the ground. The moth appearing in May, black with orange shanks, each of the fore wings with two large light yellow spots, the hind ones with two white ones. Width 1.00 to 1.50. This is a common insect at the south, and Mr. Calverley informs me he has frequently captured it around New-York. It has also been found occasionally in the vicinity of Albany.

123. BEAUTIFUL WOOD NYMPH, *Eudryas grata*, Fab. (Lepidoptera. Notodontidæ.)

In July and August, a worm in all respects like the preceding one, except that it has no white spot on each side and is slightly humped above at its hind end; burying itself three or four inches in the ground, and there passing the winter in its pupa state, the moth coming out in July. This has the fore wings milk white, bordered behind, and also on their outer side from the base to the middle with rusty brown edged on the inner side with greenish olive, and with a wavy bluish white line on the hind edge at the base of the fringe; hind wings nankin yellow with a blackish brown border which does not extend to the outer angle. Width 1.65 to 1.85. See Harris's Treatise, p. 330.

124. PEARL WOOD NYMPH, *Eudryas unio*, Hubner.

This is equally as common as the preceding, and the worms are so much alike that we as yet know not whether there are any marks whereby they can be distinguished from each other. The moths too are very similar, but the present species is somewhat smaller, and has the border of the wings paler and of a tawny red color, with the olive inner edge wavy instead of being straight as it is in the foregoing species, and on the hind wings this light red border is extended to the outer angle.

If these pretty zebra-like worms become so numerous upon the vines that it is desired to exterminate them and the handsome moths which they produce, this object will probably be most readily accomplished by picking off each leaf on which a worm is found and throwing it into the fire or otherwise destroying it. Mr. T. B. Ashton, of White Creek, informs me that in 1854 he found upwards of 150 of these worms on his vines, which being destroyed, only one worm made its appearance the next year. He also says, when the worms leave the vines, if they can find a corn cob or a piece of soft decayed wood lying on the ground, they bore into it rather more than the length of their bodies, closing the orifice with their chips, and there pass their pupa state, in preference to burying themselves in the ground. All such observations as this are of value to us, and are not matters of mere idle curiosity, as ignorant persons suppose. If the fact be as above stated, it occurs to me that whenever these worms are noticed to be common upon the vines, their further multiplication may be arrested with the greatest facility by scattering broken corn cobs upon the ground beneath, where the worms when they descend from the vines will find and will enter them, and in the autumn or spring following, raking these cobs together in a heap and burning them.

125. WHITE MILLER, *Spilosoma Virginica*, Fab. (Lepidoptera. Arctiidæ.)

A large thick-bodied caterpillar two inches long, densely covered with soft long hairs of a pale yellow, sometimes foxy red or brownish color, its skin straw yellow, commonly with a black stripe along each side, with the joints of its body and its under side also blackish. This and the caterpillar of the Isabella moth (*Spilosoma Isabella*) which has hairs much more stiff and even shorn at their ends and of a fox red color and black at each end of its body, are the two common large caterpillars seen everywhere in the State of New-York, especially in autumn, often crawling into our dwellings and spinning their cocoons behind chests and other furniture. Out of doors they place their cocoons slightly attached to the under side of boards, billets of wood, and in similar sheltered situations. The cocoon is about 0.85 long, oval with the ends rounded, of a dirty gray or pale brown color, and with the hairs of the caterpillar woven into its outer surface. The moth of this species is most common in May and June, but specimens occur at all times, coming out even in winter in stove-warmed rooms in which caterpillars have happened to secrete themselves. It is snow white with a black dot in the centre of its wings, and the hind part of its body has a row of black spots above and another along each side, with a bright ochre-yellow stripe between, and the forward hips and thighs in front are also of this last color. Width across the wings 1.50 to 2.00. The caterpillars are not stationary, but wander about and feed on a great variety of leaves, eating their edges irregularly; and they seem to regard the texture rather than the taste of their food, for I have noticed them in the greatest numbers upon trees and plants whose leaves are most soft and tender, withering from the slightest touch of frost, such as the convolvulus, bean, grape, butternut, &c. See Harris's Treatise, p. 268.

126. SPOTTED-WINGED SABLE, *Desmia maculalis*, Westwood. (Lepidoptera. Pyralidæ.)

The side of the leaf rolled into a cylinder and tied with silken threads, with a slender slightly tapering worm residing therein, 0.90 long, leaf green, having a black U-shaped mark upon its neck and black spots upon the following ring; the pupa formed in the same place, the moth coming out the last of June and in July, of a black brown color with two large roundish snow-white spots on the fore wings and the hind wings with a white band across the middle, (broken apart in the female,) and with two white bands on the abdomen. Width 0.75 to 1.15. This may frequently be met with in all parts of the United States. The males are readily distinguished from all the other insects of the order Lepidoptera by a most remarkable peculiarity. Their antennæ are elbowed, similar to those of the weevils, and ants and bees. They have a little brush-like tuft of hairs in their middle, jutting out upon one side, their first joint being long and thickened towards its tip. See Patent Office Report, 1854, p. 78.

GRAPE. LEAVES.

127. Gartered plume, *Pterophorus periscelidactylus*, Fitch. (Lepidoptera Alucitidæ.)

Consuming the young leaves, in June, and hiding itself in a hollow ball made of one or more leaves drawn together by silken threads; a cylindrical pale green worm, nearly half an inch long, with rows of white elevated dots sending out radiating white hairs, the pupa suspended by its tail and hanging with its head downwards, and in about a week giving out the moth, early in July. The moth tawny yellow, its wings split into long narrow lobes, the fore pair with three white spots and beyond these two white bands, the fringe white with a blackish spot on the middle and another on the apex of the inner margin. See Transactions, 1854 p. 843.

4. *Insects eating the leaves.*

128. Grape-vine flea-beetle, *Haltica chalybea*, Illiger. (Coleoptera. Chrysomelidæ.)

Early in spring, eating holes in the buds and leaves, a small oblong oval flea-beetle, 0.16 long, polished and sparkling, of a deep greenish blue color, some of the individuals often deep green, purple or violet, their under side dark green and their antennæ and legs dull black. This sometimes invades the plum also, as mentioned p. 362, and it also infests the elm and the alder. Its winter retreat is in crevices of the bark and in the earth immediately around the root of the tree on which it feeds, and its colors are then much less bright and sparkling than in summer. See Harris's Treatise, p. 114.

Chevrolat in Dejean's Catalogue has cut up the Chrysomelidæ into a multitude of genera. Whether the divisions which he has instituted should be received as anything more than subgenera appears doubtful. But however this may be, Linnæus originally gave the name *Altica* to a section or subgenus of *Chrysomela*, which has since been currently admitted to the rank of a genus, with a slight rectification by some authors in the orthography of its name. The species *oleracea* being originally placed at the head of this genus, must be regarded as its type. Therefore, whatever may be the destiny of M. Chevrolat's other proposed genera, that which he names *Graptodera*, under which *oleracea* and our American *chalybea* are arranged, can in our view be regarded only as a synonym. Nothing stable and permanent can ever be reached in this part of the science, if old generic names are to be cast overboard in this summary manner.

The *Eumolpus Vitis* which often sadly devours the vine leaves in southern Europe, Kirby states to be common in New-York and Canada; but I think this is a mistake.

The ROSE-BUG, No. 50, is one of the greatest pests to the vine, in neighborhoods where it abounds.

129. LIGHT-LOVING ANOMALA, *Anomala lucicola*, Fab. (Coleoptera. Melolonthidæ.)

The fore part of July beetles resembling in their appearance the May-beetle, No. 76, but of a much smaller size, being only about 0.35 long, become common on both wild and cultivated grape vines, feeding upon the leaves. From their colors and marks they would appear quite plainly to be of at least four very distinct species, and Fabricius has named and described three of them as such. But as they are always found associated together, and similar insects in Europe vary similarly in their colors, it is probable they are as authors have supposed, mere varieties of one species. They may be distinguished as follows:

1. The GLOOMY ANOMALA (*A. mœrens*, Fab.,) of a pale dull yellow color, the thorax sometimes reddish, and with the knob of the antennæ and the middle of the breast black.
2. The SPOTTED NECK (*maculicollis*,) like the preceding, but with a black stripe or large spot on each side of the middle of the thorax, and often the hind part of the head and the outer side of the wing covers also black.
3. The LIGHT-LOVING (*lucicola*, Fab.,) pale dull yellow with the thorax black except on each side and on the middle of its hind edge, the hind part of the head, the scutel and under side of the body being also black, with the abdomen brown or sometimes dull yellowish.
4. The BLACK (*atrata*, Fab.,) black throughout, the abdomen commonly tinged slightly with pale. See Harris's Treatise, p. 29.

130. SPOTTED PELIDNOTA, *Pelidnota punctata*, Linn. (Coleoptera. Scarabidæ.) [Plate ii, fig, 6.]

A large broad oval beetle of a pale brownish yellow color, with a black dot on each side of the thorax and three others along the outer side of each wing cover, as represented in the figure on plate ii, may almost always be found on grape vines, in July, August and September, and numbers of them frequently occur upon the same vine. See Harris's Treatise, p. 22.

131. WHITE FLOWER-CRICKET, *Œcanthus niveus*, Degeer. (Orthoptera. Achetidæ.)

Mounted among and feeding upon the leaves of the vine, in August, a slim narrow cricket about 0.70 long, of a clear white color throughout.

The genus Œcanthus to which this insect pertains, was founded by Serville upon a species common in the south of Europe, named *pellucens* by Scopoli, for specimens of which, with many other European Orthoptera, I am indebted to M. Brisout de Barneville. Congeneric with this European insect we have three species in the United States, which are but little known, although they were named and described by Degeer nearly a century ago, and two of them are so common in the State of New-York that their song is often heard upon the vines and bushes in our yards, night after night, through the latter part of summer. And as they are on several accounts an interesting and singular kind of cricket, I here present the investigations which I have made relating to them.

The European and our American flower crickets all bear a striking resemblance to each other, both in their external appearance and their habits, showing this to be one of the most natural genera in the family to which they pertain. They also differ very much from all the other crickets. They are mostly of a clear white color instead of black or dull brown which are the prevailing colors among the insects of this group. Their form also is long and narrow, particularly in the females, which have the wings wrapped more closely around the body than they are in the males. Their hind legs also are long and slender, resembling those of a grasshopper more than a cricket; and their hind feet have four joints, all the feet in other crickets having three joints only. Brulle, who subjected the European species to a rigid examination, and was the first to detect the number of joints in its feet, and some other important points in its structure, states (Hist. Nat. des Ins. vol. ix, p. 174) that the thorax of this genus is of a conic form and narrower towards the head than at the opposite end, and Serville repeats this, as being one of the most prominent characters whereby the insects of this genus may be distinguished. But, as we shall see, the form of the thorax varies greatly with the species, and approaches a conic form in only one of our American flower crickets. The other marks, however, which we have stated above, will suffice for readily distinguishing the insects of this genus.

In their habits they also differ remarkably from other crickets. The observation of Latreille, that they dwell upon plants and are pleased with flowers, applies with considerable exactness to our American species, which may be met with in autumn quite common upon the flowers of the golden rod (*Solidago*), and in August I have noticed them on rose bushes, several individuals being sometimes seen on one bush. It was from this statement of Latreille that Serville gave the generic name *Œcanthus* to these insects, this name being formed from two Greek words, implying "I dwell in flowers." But any situation where the foliage is dense, furnishing them a cool shady hiding place, appears to be what they particularly desire, as they occur quite frequently on grape vines, on young oaks and other bushes, where no flowers are near them. All other crickets it will be recollected reside upon the ground, in holes under stones, and similar situations. And it has been noticed of these insects and their kindred, that a peculiarity in the structure of their feet appeared to be essential to adapt them for the situations in which they reside—the catydids and other insects which dwell upon shrubbery having soft flat cushion-like soles to their feet, to enable them to cling to the stalks and leaves of plants, whilst in the crickets and other insects which reside upon the ground no such structure exists, (Westwood, Introd. i, 441.) The flower crickets, however, appear to present an exception to this rule. They always reside upon plants, elevated from the ground, and yet the under sides of their feet are simple and merely covered densely with bristles, like those of other crickets. But perhaps this is no just exception to the rule stated. Though they dwell on plants, they do not travel about upon them, but remain stationary, each one in his own chosen abode, day after day. So I infer, from having noticed the song of one of these insects proceeding from the same spot upon a mass of vines or upon a particular limb of a tree, upon each evening for a number of nights in succession. And it is quite probable therefore, that the simple structure of their feet incapacitates them for clinging and leaping about from one leaf to another.

Some of our most important information respecting the habits of the flower cricket we obtain from a Memoir published in Italy more than a century ago, by M. Louis Salvi, no subsequent writer appearing to have observed the same facts. From him we learn that the female with her awl-like ovipositor pierces upon their under side the green succulent stalks of the vegetation on which she resides, to the very pith, and crowds commonly only a pair of eggs into the nest thus formed. A number of these punctures are made near each other, till her whole supply of eggs is disposed of. The eggs remain till near the middle of the following summer, when they give out the young crickets, which resemble their parents in form, except that they are without wings. They secrete themselves in the thickest masses of leaves, until they get their growth, changing their skin several times.

In the southern part of our State the song of the flower cricket begins to be heard as early as the first of August, but it is a week later before it commences in the vicinity of Albany, and later still in the more northern parts of the State. Perched among the thick foliage of a grape vine or other shrubbery, some feet up from the ground, and as already stated, remaining in the same spot day after day, its song begins soon after sunset and before the duskiness of twilight arrives. It is distinctly heard at a distance of several rods, and the songster is always farther off than is supposed. Though dozens of other crickets and catydids are shrilling on every side at the same time, the peculiar note of this cricket is at once distinguished from all the rest, consisting of repetitions of a single syllable, slowly uttered, in a monotonous melancholy tone, with a slight pause between. The children regard this cricket as no votary of the temperance cause; they understand its song to consist of the words *treat—treat—treat—treat*, which words, slowly uttered, do so closely resemble its notes that they will at once recall them to the recollection of almost every reader. And this song is thus continued without the slightest variation and without any cessation, I think, the whole night through. I however have sometimes heard it at the first commencement of its evening serenade uttering three syllables resembling the words *treat*, *treat*, *two; treat*, *treat*, *two*—as though the songster was supplicating a libation for his voiceless female mate as well as himself—a longer pause following each third note. This prelude is probably performed in limbering or otherwise adjusting his organs, preparatory to performing the regular carol, which is struck into in a few moments.

It merits, in passing, to be remarked, that whilst the song of the common cricket of the eastern continent aids in producing sleep and has been so much valued on account of this property that it has in some countries been made an article of traffic, and inclosed in cages is placed in the dormitory, the song of our flower cricket has exactly the opposite effect. Occasionally, from vines growing in front of the window, one of these little musicians will find his way into the bed-chamber, when, as Dr. Harris observes, his incessant and loud shrilling will effectually banish sleep. Perhaps the lodger out of all patience at last gets up and makes for the spot from whence the annoyance proceeds; but the song abruptly ceases with his approach. He however fumbles around in the dark, beating upon the wall high and low, and probably encountering an unexpected number of chairs and washstands, till he flatters himself he has destroyed his tormenter or has at least frightened him into silence for the rest of the night. Then returning to his pillow and adjusting himself again for sleep, he is able to exult in the sweet stillness that pervades the apartment, for a moment only, before the same execrable creaking breaks forth again as shrill and vigorous as before.

Many persons have noticed the catydid when singing, so far as to see that it is by rubbing its hind legs against the outer sides of its wing covers that its stridulation is produced. In the cricket, however, the hind legs are much shorter, and here we find that it is not by them but by raising its wing covers slightly so as to rub the under surface of one of them against the inner edge of the other that its song is caused. As the flower crickets have long slender hind legs similar to those of the catydids, we might suspect their note to be produced in the same manner. We however find that in this as in so many other points they are related to the crickets. And when we come to examine their wing covers, we are able to discover the very curious apparatus by which their stridulation is produced; and we find a peculiarity in its structure which at once explains why it is that the song of this insect consists of a single note always followed by a full pause or total cessation of the sound, instead of being continuous or nearly so as it is in other crickets.

In the males the wing covers are flat and placed horizontally upon the back, with their outer third turned perpendicularly downwards and covering the sides. They are very thin and transparent, like clear glass, and may be compared to a window, with the veins like the sash dividing them into a number of panes or cells of various sizes and shapes. The four largest of these cells are placed in the disk or middle part of the wing, and are divided from each other by three straight veins, crossing the wing obliquely, the two hind ones parallel with each other, the forward one meeting these at a right angle and forming with them the likeness of a very full-faced letter V impressed transversely. They thus resemble stout braces so placed in the wing as to keep the ribs and other longitudinal veins pressed asunder, hereby putting on the stretch the delicate membrane which forms the panes between the several veins. Thus each of these panes is like the head of a little drum or tabor, and when played upon, all vibrating at the same instant produce the one shrill note which this insect utters. And to augment the sound still more, it may be observed that the membrane forming each one of these panes is not a simple smooth surface, but is striated with numerous little elevated lines.

It now remains for us to describe the curiously constructed instrument by which all these little tabrets are excited into vibration. On the inner margin of the wing cover, at the anterior end of the V-like mark above described, will be seen a small thickened or callous-like spot from the fore part of which four veins extend to the base of the wing. The inner or hindmost one of these is the most thick and stout, and when particularly inspected it is found to be in several respects different from all the rest of the veins. It first runs straight inwards, almost transversely, and then abruptly turning extends with a curve to the base of the wing, this curved portion being more slender. On the upper or back side of the wing this vein is pressed strongly downwards, whereby a furrow is formed in the surface above it. On the under side it stands out from the surface in bold relief, forming an elevated ridge. Now it is this prominent ridge which is applied to the inner edge of the opposite wing cover, and as it runs transversely it will at once be seen that when the wing covers are slightly spread apart and closed again, the motion will draw this ridge up and down against the edge to which it is applied, precisely like the bow of a violin playing upon the strings. This vein may therefore appropriately be named the fiddle-bow, M. Goureau the only one who has particularly described these parts in the common cricket having given to it the corresponding French term *archet*. But if this vein were smooth like the other veins it obviously could produce no vibration. It would be like a fiddle-bow when greased. On examining it therefore with a magnifying glass in a strong light, an appearance like that of very fine transverse lines may be discovered. And on being placed in a microscope the real structure of this part may plainly be seen. What at first appeared like fine transverse lines is found to be a regular row of little flat cogs or teeth, resembling the front teeth of man, but rather more broad than high and slightly narrowed into a neck at their bases. They are inserted at short distances apart, somewhat as the nails of the fingers appear when the end of one finger is placed upon the top of another in a row. It is but a short portion of the most projecting part of the vein that is occupied by these teeth—little more than the twentieth of an inch in length; and in that short distance twenty-one teeth are inserted, with intervals between which are more than double the length of the teeth. The teeth do not stand perpendicular to the surface, but incline towards the inner margin of the wing cover, and that portion of the vein which is studded with them is about the tenth of an inch from the inner edge. We shall now be able to understand the cause of the several peculiarities in the stridulation of this insect. It will readily be perceived that its fiddle-bow being drawn against the edge of the opposite wing cover, and the teeth with which it is furnished grating thereon will cause such a jar in the sash or frame work of both wing covers as will impart a brisk vibration to all the little tabrets or membranous cells which are placed in this frame work. And the shrillness of the note of this insect is due to the extreme thinness of the membranes and the violent vibrations into which they are thrown by the sharp grating which these projecting teeth of the fiddle-bow with the little intervals between them produce. As the teeth incline inwards they act only when the wing covers are shutting together; when they are opening apart no grating can occur. It hence results from this peculiar mechanism that as the wing covers are successively opened and closed, notes and intervals of about equal length are alternately produced. The row of teeth moreover being so short, they can cause a vibration of only a moment's duration, and it is not in the power of the insect to produce a continuous sound or a prolonged note. The reason of the several differences between the song of this and of the common cricket, whose stridulation has been described with so much exactness by M. Goureau (Annals Soc. Ent. vol. vi, p. 34) are all readily explained by the differences which we find in the structure of the wing covers in these two insects. In the common crickets both of Europe and of this country, the fiddle-bow instead of projecting teeth is merely furnished with elevated transverse ridges or ribs, and these occupy its whole length. Hence its note is more prolonged and far less loud and shrill than that of the flower cricket. M. Goureau was able in the dead insect to so move its wing covers whilst they were still pliant, as to produce the same sound which it utters when alive; and by merely scratching with a pin upon the fiddle-bow he found this sound was produced, though more feeble, as but one wing cover was hereby vibrated.

The WHITE FLOWER CRICKET measures about 0.50 to the tip of its abdomen and its total length is about 0.70. It is of a milk-white color, sometimes with a slight tinge of green. The tips of its feelers and of its feet are tawny yellowish and there is commonly a spot of the same color upon the top of its head, which is oblong and broader at its hind part, commencing between the bases of the antennæ and extending back to a line with the hind side of the eyes. The eyes in the living insect are of the same white color with the body, but after death change to a brownish clay color, though in some specimens they remain white. Upon the under side of each of the two first joints of the antennæ is a black dot, which is sometimes lengthened into a slender stripe or line, and in rare instances a second dot is present upon the inner side of each of these joints. The tip of the ovipositor of the females is also black. These are all the characters which are presented by the color in this insect. Numerous others, however, are derived from the form and sculpture of its several parts, of which we notice the following.

The HEAD is twice as long as wide and is inclined downwards obliquely and in the preserved specimens often perpendicularly. It is shaped like an egg, moderately flattened upon its upper side. In dried specimens it is crossed between the eyes by a wide shallow groove. The feelers or *palpi* are long and thread-like, composed of cylindrical joints, of which the penultimate one is almost as long as the last one, which is slighty thicker, long oval, and on its inner side obliquely cut off in a straight slope extending two-thirds of the length of this joint, the face of which slope is hollowed like the inside of the bowl of a spoon. They are clothed with fine erect bristles, in addition to which the last joint is densely coated with much finer prostrate hairs. The *antennæ* are double the length of the body, tapering and very slender, composed of a hundred joints or more, the articulations of which are faint and towards the apex are scarcely perceptible. The basal joint is thrice as thick as the following one, cylindric and but little longer than wide. The succeeding joints are very short, and towards the tip gradually increase in length and diminish in diameter, here sometimes showing tawny brown rings upon the alternate joints.

The THORAX is as wide as long and of the shape of a half cylinder, being rounded from above downwards, with its opposite sides parallel and its angles rounded. On each side low down it forms a thin foliaceous edge which hangs downward and curves a little outward. Both the anterior and posterior edges curve slightly upward and the latter is fringed with short pale yellowish hairs. Upon its surface posteriorly a shallow furrow may be seen along the middle and on each side of it a curved impressed line.

The ABDOMEN is long, cylindrical, soft and often much distorted in the dried specimen and discolored from inclosed alimentary matter. It ends in a pair of long slender tapering appendages which are about equal to the abdomen in their length and are clothed with fine erect whitish hairs. In addition to these in the female is the ovipositor, which is of the same length, with the appendages, reaching to the tip of the wing covers, and is of a hard horn-like substance, cylindrical and straight or very gently curved upwards.

The WING COVERS of the *male* have already been partly described. When folded together they appear perfectly flat and of the shape of an egg with its small end forward. They are rather more than half an inch long, and the breadth of their upper horizontal portion is more than half their length. Their deflected outer portion or costal area is divided by oblique veinlets into about ten cells of a rhombic form. Above these is an elongated elliptic area reaching three-fourths of the length of the wing cover, bounded on each side by two coarse longitudinal veins which are the proper ribs of the wing. This elliptic area is subdivided into several small square cells by veinlets crossing it transversely. The horizontal portion of the wing covers have two veins running parallel with the hind edge and the hind part of the inner edge. The remaining veins have already been described. In the *female* the wing covers are quite unlike those of the male, being much narrower, and wrapped more closely around the body, giving this sex a more slender form. The flattened upper portion is cut up into many small cells which are mostly square and are formed by six or seven parallel veins which arise from the base of the wing covers and from the inner rib-vein and run obliquely backwards and slightly inwards to the inner margin, and are connected to each other by numerous transverse veinlets. The deflected outer or costal area is similar to that of the males. The longitudinal rib-veins do not form any elliptic area like that in the male. The *wings* are folded together lengthwise under the wing covers, and are of the same length with them in the male, whilst in the female they are longer and project beyond their tips the eighth of an inch or more, resembling little conical tails.

The four forward LEGS are rather slender and of moderate length and clothed with fine short soft hairs. The thighs are cylindrical and have a shallow groove along their under side. The shanks are but half as thick as the thighs and taper slightly towards their tips. The forward ones near their bases are flattened and widened and show on both sides a deeply impressed oval and almost transparent spot appearing like a scar. The feet have three joints, of which the first one is long and cylindrical, the middle one is very small and only about as long as it is wide, and the last one with the claws at its tip does not differ from the same joints in the hind feet. The *hind thighs* are very long and slender, nearly equaling the tip of the wings and of the ovipositor. They are much thickened towards their bases, flattened on their inner side and strongly convex or rounded on their outer side. They have a narrow straight groove running their whole length, both on the inner and the outer side, and an elevated line along their lower edge. The *hind shanks* are also long and very slender and thread-like, equaling the thighs in their length and like them clothed with very fine short soft hairs, in addition to which they have along their hind side two rows of small sharp spines or prickles which reach almost to the knee, with three or four pairs of coarser ones towards their lower end, and a crown of coarse ones at the tip whereof two are much longer and have small thorn-like points branching from them. All these spines are white with their points black. The *hind feet* are covered with minute spines or thorn-like points. which are very densely crowded on their under sides. These feet have four joints, one more than is found in other insects of the cricket kind, but the articulation to the middle of these joints is so slight in the present species that it is often wholly imperceptible in the dried specimens. The basal joint is lông and cylindrical and forms three-fourths of the total length of the foot. The second joint is of the same diameter with the first, but is quite short, only as long as wide, with the suture at its base slight and often discerned with difficulty. It is cylindrical and divided into two parts by a suture running lengthwise upon each side. The upper half forms two large stout spines, the bases of which are articulated to the apex of the first joint, their lower edge is joined by a suture to the lower half of this second joint its whole length, their tips only being free, jutting onward and overlaying the third joint more than half its length, each spine tapering to a point which is black and curved gently upward. The third joint is of the same length with the second but much narrower, when viewed laterally appearing twice as long as wide and of a square form with the apex cut off obliquely. The last joint is more slender and longer than the preceding two taken together, slightly arched and thicker towards its tip. At its apex two small stout and almost straight claws are articulated at right angles with the foot, and at the base of each claw is a small cylindrical pellet, half as long as the claw and of the same diameter, with its apex cut off obliquely.

The following VARIETIES of this species have fallen under my notice:

a. The black dots on the under side of the two first joints of the antennæ lengthened into short stripes.

b. First joint of the antennæ with a black transverse stripe beneath, at its apex, forming a right angle with a longitudinal stripe.

c. Two first joints of the antennæ with a black stripe on their inner and a black dot on their under sides.

d. Head without any spot or discoloration above.

e. *discoloratus*. The whole of the head, the first joint of the antennæ, the breast and abdomen of a brownish clay color.

f. *fuscipes*. One or both of the hind legs more or less tinged with blackish.

g. *angustipennis*. The male with wing covers a third narrower and somewhat shorter than usual, with the wings protruding like tails from under their tips. Having seen but a single specimen, I cannot regard this as anything more than a variety, since in other species of this family we meet with individuals having the wing covers but partly developed.

With the detailed description of this species which has now been given, it will only be necessary for us to state the more prominent points in which the two other flower crickets of our country differ from it.

We suppose these insects do more mischief by perforating the twigs of different trees to place their eggs in them, causing the death of the parts thus wounded, in many instances it is probable, than by eating the leaves. We are not aware that they ever become so numerous upon vines as to require any exertions for their destruction. Dr. Harris states that they were noticed in one instance piercing and placing their eggs in the branches of a peach tree, and that the tobacco cultivated in Connecticut has sometimes been injured by these crickets eating the leaves. Wherever their numbers and operations render them pernicious, the only mode we are able to suggest whereby to abate the nuisance is to pick them from the leaves by hand and destroy them.

GRAPE. LEAVES.

132. Striped flower cricket, *Œcanthus fasciatus*, Degeer.

A slender white cricket very similar to the preceding, but having three blackish stripes upon the thorax, the antennæ, abdomen and legs being also black or dark brown, and the thorax narrowed anteriorly.

This is almost as common as the foregoing, in the State of New-York, and the two are often met with associated together upon the same shrubbery. And it is this insect which Dr. Harris describes as being the female of the preceding species. He evidently was unacquainted with the work of Degeer and the characters he assigns to these insects, or he would have been aware of his error, the marks by which this species is distinguished being so plain and so explicitly stated by that author. And the number of specimens which he had for inspection must have been quite limited, or he would have been aware of the fact that females occur which are of the same white color throughout as the males of *niveus*, and that males occur which have the three black stripes on the thorax and the other marks which he supposes are found in females only. And though in their size and form these two insects are most intimately related to each other, when we come to submit them to a careful inspection differences may be detected which, in addition to their colors, serve to assure us that they are really distinct species. Thus, the thorax here is plainly narrowed anteriorly, instead of having its opposite sides parallel with each other. The thin foliaceous edge at its lower margin on each side here hangs perpendicularly downward instead of being curved slightly outward. The furrow along its middle, between the centre and the hind edge, is here more deeply impressed, as is also the curved line upon each side of this furrow. In the wing covers of the male, from the convex side of the curved vein which we have named the fiddle-bow three veins are given off which are parallel and equidistant from each other, and end in a vein which runs lengthwise of the wing, these three veins obviously serving as braces to hold the fiddle-bow tense and firm for the important office belonging to it. In the present species these three veins are straight and run directly into the longitudinal vein at their outer ends, whilst in *niveus* they curve backwards and enter the longitudinal vein very obliquely. The feelers also are rather more short and thick in this species, and the slope on the inner side of the tip of the last joint is more distinct and more deeply excavated. Such are the principal differences which the specimens before me indicate as existing between these species. But as a large portion of the insects of this order are subject to considerable variations in the form and sculpture as well as the color of their several parts, it is possible that other specimens may not show all these details to be as I have reoresented them.

133. DOTTED FLOWER CRICKET, *Œcanthus punctulatus*, Degeer.

A slender white cricket with the head and thorax dull brownish yellow above, the thorax twice as long as wide, and the wing covers transparent with a dusky dot or small oval spot in their centre.

This probably occurs upon the same shubbery on which the two preceding species dwell. I have never met with it in New-York, though it will very likely be found within our borders, Degeer having described it from specimens taken in Pennsylvania. The male is unknown to me, the female only having been sent me from the Southern States. It is more long and slender than the other species, measuring to the end of its body 0.50, wing covers 0.60, ovipositor 0.75, and to the end of its wings 0.90. It differs so far in some important points from each of the other species that some future writer will no doubt make it the type of a distinct genus, a step which would be eminently proper should another species be discovered coinciding with this in those differences.

The *thorax* is long and narrow, twice as long as wide, and when viewed from above appears cylindrical with each end a little dilated or curved outwards. The thin foliaceous margin upon each side is turned outward almost horizontally, its hind part being widened. Upon the posterior part of the upper side is a large round impressed spot appearing as though stamped with a seal, its outer side forming a right angle. The *wing covers* in the females are but little more than half as long as the wings and are very thin and transparent, with opake white veins, whereof there are two straight longitudinal rib-veins the inner one of which is double, and the space between these two veins is divided into a number of small square cells by transverse veinlets. The deflected outer area is crossed obliquely by parallel veins connected by transverse veinlets dividing the surface into numerous cells which are mostly square, those at the base being much more small and irregular. The flat upper portion is cut up into numerous irregular cells of various sizes by a net-work of short veinlets unastamosing in every direction. The central dusky brown spot is placed upon the inner side of the double rib-vein, and commonly there is a more faint spot forward of this, which on its inner side is confluent with a slight cloudiness of the same color which extends from the central spots forward along the middle of the back to the base. Often also a third spot, much smaller, may be discerned in the second or third cell back of the central spot. The *ovipositor* is as long as the abdomen and perfectly straight; its sides are dark brown and its end black. The two appendages at its base are much shorter than in the other species, being scarcely half the length of the ovipositor. The *feelers* are sensibly shorter and thicker than in the other species, their penultimate joint having the form of a reversed cone, its length scarcely double its width and less than half the length of the last joint, which is thicker than those which precede it, and on its inner side is very plainly cut off in a sloping direction from the middle to the tip, with the face of this slope deeply excavated and causing the joint to appear like a hollow tube. The *antennæ* are blackish on their upper side towards the base, or have a black ring at the tip of each joint.

10. THE CURRANT.—*Ribes rubrum.*

We place this shrub and the gooseberry in this connection, as their woody stalks and the form and texture of their fruit give them such a close relationship to the grape; though they might with perhaps equal propriety be classed with the raspberry, straw berry and other small fruits of the kitchen garden.

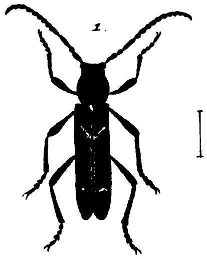
AFFECTING THE STALKS.

134. American currant borer, *Psenocerus supernotatus*, Say. (Coleoptera. Cerambycidæ.) [Plate ii, fig. 1.]

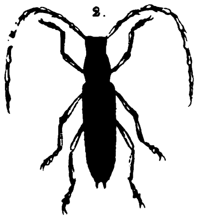
Feeding upon the pith of the currant and killing the stalks, a small cylindrical white worm wholly destitute of feet and with a small chestnut brown head and black jaws; passing its pupa state in the stalks and the latter part of May changing to a small slender long-horned beetle of a black color edged with chestnut brown, its wing covers each with two small gray spots forward of their middle and a white crescent-shaped one towards their tips.

In all our gardens numbers of the currant stalks perish every season. To such an extent does this mortality prevail that this fruit would soon disappear from our country were it not that the roots of this shrub are so vigorous, sending up a multitude of new

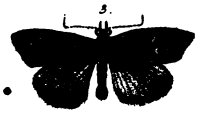
PLATE. 2.



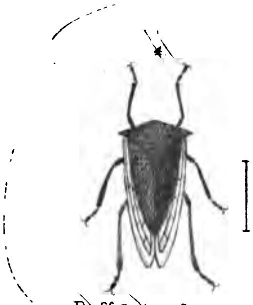
Currant borer.



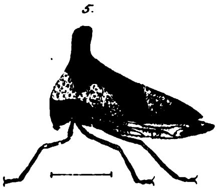
Oak pruner.



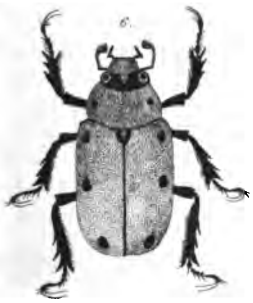
Cherry Tortrix.



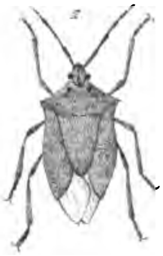
Buffalo tree hopper.



Thorn-bush tree hopper.



Spotted Pelidnota.



Large tree bug

A. Tolley. Sc

Lith. of C. Van Benthuysen. Albany N.Y.

shoots every year, whereby the places of those that perish are constantly re-supplied.

After the leaves have fallen in autumn and during the winter these dead stalks are readily distinguished from the live ones by being dotted over with a pretty little fungus the size of a pin head and of a pale bright red color and a corky texture, which I suppose to be the *Sphæria Ribesia* of Fries. Another fungus also appears on the small twigs, very similar to this but having its surface flattened and of a coal black color.

If one of these currant stalks is split asunder the cause of its death is plainly evident. Commonly through the whole length of the stalk the pith is found to have been eaten away by a worm, leaving it hollow or filled in places with a loose woody powder, like fine sawdust. Each of the branches is also found to be bored in the same manner. And lying in this cavity, one, two or more of the worms which have done this mischief are met with, in all the stalks which have recently been destroyed.

The only insect to which this injury has heretofore been imputed in this country is a kind of moth closely related to the Peach tree borer, which perforates the currant stalks in Europe in this same manner and has been brought to this country with the currant. But the past winter, on coming to inspect these worms, finding they were wholly destitute of feet, I became assured they were a different insect from that which they have all along been supposed to be. And on rearing some of them to their perfect form, I obtained in place of the European currant borer, a beetle, one of the native insects of this country whose history has hitherto been unknown, and which is nearly related to the Apple tree borer.

This insect is the *Clytus supernotatus* of Mr. Say (Jour. Acad. Nat. Sci. iii, 425) and of Prof. Haldeman, (Trans. Amer. Phil. Soc. x, 42) and the *Psenocerus Pini* of Dr. Leconte (Jour. Acad. 2d series, ii, 581) and of the Catalogue of Coleoptera lately published by the Smithsonian Institution. It would be an incongruity much to be regretted in the scientific names of the insects of our country, if this species which subsists upon the currant had received a name indicating it to belong to the pine. But fortunately this is not the case. The *Callidium Pini* of Olivier, which Dr. Leconte supposes to be the same insect with the *supernotatus* of Say is in reality a very different species pertaining to Dr. Leconte's new genus *Euderces*. How they have come to be pronounced the same it is difficult to understand, since Olivier explicitly states that the antennæ of *Pini* are longer than the body, whilst Mr. Say informs us they are shorter than the body in his species. Olivier's figure *a* of *Pini* is a very correct representation of the insect as it appears to the naked eye. His enlarged figure *b* is much less accurate, especially in the coloring and in placing the posterior white band too far forward. His description of this insect shows this enlarged figure to be inaccurate, and coincides so perfectly with my specimens as to leave no doubt respecting the species to which the name *Pini* belongs. The *Piniadeus* of Fabricius is evidently the same insect described more briefly and much less accurately. Both authors doubtless drew their descriptions from the same specimens, as they both cite the cabinet of Bosc as containing the insect they describe, which insect was found upon pine trees in the neighborhood of the city of New-York Olivier states, whilst Fabricius gives Carolina as its locality. The latter is probably correct, as I have never met with this insect in New-York, and know it only from specimens sent me from west of Arkansas by Mr. Wm. S. Robertson.

The whole length of the dead currant stalks and their branches, from the buds at their tips down to the surface of the ground is commonly found to have been mined by these borers. The hollow in the branches is usually but not always continued down into that in the centre of the main stalk. At least a foot in length of the pith appears to be required to support one of these worms and bring it to maturity. They are particularly fond of the younger and more tender stalks, and these being small have their whole interior ate away almost or quite out to the bark, so that they resemble hollow straws or sticks that have been consumed by white ants so that merely an outer shell remains. And not unfrequently a portion of the upper end of the stalk is broken off, from being so much weakened. The worm hereupon essays to plug up the opening thus made, with its sawdust-like chips, to prevent rain from entering its cell and to exclude spiders and other enemies. Sometimes a greater number of worms are placed in a particular stalk than can be accommodated in the pith. In this case some of them resort to the soft outermost layers of the wood immediately beneath the bark, where broad shallow burrows stuffed with the castings of the worm will be met with, occasionally with the worm lying in them. I have in one instance found twelve worms in the different parts of a single stalk.

When the worm has completed its growth and is about to leave off feeding it gnaws a small orifice out to the bark through the wooden wall by which it is surrounded, in order that when it has changed to a beetle it can make its exit from its prison by merely rupturing the bark. The hole thus made is then stuffed full of little chips to protect the bark from being prematurely broken. It then withdraws itself down the stalk slightly below this hole, and constructs a bed on which to repose during the long period of inactivity that now follows. This bed is formed of short woody fibres wadded together and filling the cavity for the length of about half an inch. A similar mass is commonly placed above the worm also, formed mostly of finer materials like sawdust intermingled with brown and white grains, the castings of the worms. The space between these two partitions is about half an inch in length and forms the chamber in which the worm reposes until it changes to a beetle. In the Entomological Museum at the Agricultural Rooms is a currant stalk showing the burrow of this insect, with one of the worms lying in its cell, having a slip of transparent mica cemented over it, and also showing slightly above it the orifice which this worm had cut through the wood whereby to make its exit.

It is about the first of June that the parent insect deposits her eggs upon the currant stalks, and the worms get their growth by the close of the season. They repose in their cells through the winter, changing to pupæ with the warmth of the following spring, and begin to appear abroad in their perfect state as early as the middle of May, the sexes pairing immediately after they come out.

Although the larvæ of this insect are now found in such abundance in the stalks of the cultivated currant in our gardens, before this shrub was introduced upon this continent it doubtless sustained itself upon the wild currant. And it probably is not limited to this genus of plants but feeds also upon several other small shrubs growing in our fields and forests, the stalks of which have a texture similar to that of the currant. I infer this from the first pair of these insects which I met with, twenty-five years ago, occurring upon the small-flowered honeysuckle (*Lonicera parviflora*) near which no currant bushes were growing.

The LARVA of this insect is nearly or quite 0.30 long and about 0.07 in diameter, cylindrical and divided into thirteen segments by deep wide transverse constrictions, the last segment being narrower and more or less retracted into the one which precedes it. The head is scarcely half as broad as the body, short and wide, flattened, dark chestnut brown with the base whitish and with short stout triangular black jaws. The second segment or first ring is pale tawny yellow above on its anterior part, the rest of this ring and all the remaining segments being white, rarely straw yellow, shining, soft and flesh-like. It is wholly destitute of feet. To compensate for this deficiency the worm upon the back and beneath is furnished with a cluster of small round tubercles or elevated dots forming an oval spot upon the middle of each segment, whereby it is aided no doubt in clinging to the walls of its burrow as it moves about therein. The breathing pores form a row of cinnamon brown dots along each side. The body is slightly clothed with very fine short hairs, which on the last segment are more numerous and rather longer.

The BEETLE is 0.18 to 0.23 long, the thorax almost as wide as the wing covers and nearly as broad as it is long, with its sides convex. The head and thorax are covered with small deep confluent punctures, those upon the wing covers are much more coarse and are deep and confluent except on the tips where they become smaller and slightly separated. The wing covers have a broad round elevated spot or tubercle at their base, and a narrower hump upon the shoulder. Its color is black with the margins of the wing covers and thorax pale chestnut brown. The wing covers have a large milk-white spot beyond their middle, which is transverse, crescent-shaped with the convex side forward, the inner end slightly separated from the suture and the outer end often reaching to the outer margin; and forward of their middle are two small spots which are sometimes buff yellow, sometimes ash-gray, the forward spot being a short oblique line placed nearer to the suture than to the outer margin, the other spot being a small dot which is often oblong, situated back of the inner end of the first and nearly as far from it as from the suture. All these spots are formed by very short hairs or more properly scales, which are appressed to the surface and in old individuals become rubbed so that the forward spots are more obscure or partially obliterated. The scutel is ash-gray from similar scales. The antennæ are pale chestnut brown, commonly with a darker brown or blackish band on the thickened apex of each joint, and they are thickly covered with short fine incumbent ash-gray hairs which in a particular reflection of the light give a gray color to the basal portion of the longest joints. They are shorter than the body, thread-like, their first joint thickest, long and tapering to its base, their second joint short, but little longer

MSU

than broad, and shaped like a reversed cone, the two succeeding joints longest of all, the fifth one much shorter and all the following ones shorter still, the last one being pointed at its tip. The under side is black with small punctures which are close and somewhat confluent, and the surface is thinly covered with short incumbent gray hairs. The legs have similar hairs and are pale chestnut with the thickened part of the thighs black and sometimes the tips of the shanks also, the forward shanks presenting a slight wide transverse concavity on their insides.

Variety *a*. Color chestnut brown throughout.

In the cavity in the interior of diseased currant stalks, I have met with a small mite, which is described on one of the following pages, and also with two kinds of larvæ in addition to those of the currant borer. One of these larvæ lies naked among the chips made by the borer, and is scarcely 0.10 long, white, glassy, without feet, tapering to a point at one end, which point is thrust out and retracted at the pleasure of the worm and shows two blackish parallel lines upon one side. I have not yet succeeded in obtaining these in their perfect state, but they are evidently the maggot of some small two-winged fly, which is not a parasite upon the borer, for the remains of no dead worm are seen near them. Their further habits and economy still remain to be traced out.

The other worms are parasites, several of which live together in the body of the borer till they get their growth; by which time they have consumed all the internal parts of their foster-parent so that only the outer skin remains. They then crawl from this skin and spin their cocoons at short distances one above another in the cell. Their cocoons are 0.20 long and of sufficient width to fill the cavity where they are placed. They are thin and almost transparent, appearing like a fine membranous substance through which the worm within can plainly be seen. After finishing their cocoons they cast their skins, which form a little black mass in the upper end of the cocoon. The worms as found in these cocoons in the winter season are 0.13 long by 0.06 in width, white, shining, soft and of a flesh-like substance, their form elliptic but curved into the shape of a crescent, the sutures marked by transverse lines slightly constricted, with a very fine pale brown transverse line placed at the mouth. These worms change to pupæ in the spring and give out the perfect insect the fore part of June. They thus come abroad about three weeks after the borers have come out, so that by the time they are ready to deposit their eggs the larvæ of the borer will be grown to a sufficient size to meet their wants. For with such forethought and skill has Omniscience appointed the times and seasons of every creature, that each little insect comes into existence upon the very day that its food is in readiness and everything is matured for it to fulfill its allotted work in the economy of nature.

This parasite of the currant borer is a small four-winged fly pertaining to the order *Hymenoptera* the family *Ichneumonidæ* and the sub-family *Braconides*. It is 0.10 long, black, the first joints of its antennæ and its feelers and legs deep honey-yellow, its mouth, fore-breast and the two first segments of the abdomen darker yellow with a black spot on the first of these segments, and with a yellowish cloud upon the middle of the third segment, the under side of the abdomen being black-brown. Its ovipositor resembles a small bristle and is about a third of the length of the abdomen. It is probable that as this insect walks up and down upon a currant stalk with its antennæ applied to the surface and rapidly vibrating, the sense of feeling possessed by these organs is of such exquisite delicacy that it is able to detect the very spot where a small worm is lying in the centre of the stalk, and that it then insinuates its ovipositor through the bark and wood and punctures the skin of the worm, inserting therein as many eggs as the borer will be able to sustain.

I have attached the name *Cenocœlius? Ribis* to this insect in my cabinet. The prædiscoidal cell of the fore wings occupies but two-thirds of the length of the oblique vein which bounds its anterior side, the first submarginal cell occupying the remainder of this vein, thus separating the prædiscoidal cell widely from the costa. This induces me to refer this insect to the genus *Cenocœlius* of Westwood's Synopsis, though I am by no means certain that it is congeneric with the undescribed species named as the type of that genus. The feelers are very slender and elongated, the maxillaries being longer than the head and about equal in length to the anterior thighs. The head is nearly as long as broad and sub-globular. The antennæ are slender and almost as long as the body. The abdomen is obovate or nearly oval, slightly depressed, equaling the thorax in length and exceeding it in width.

It should be observed before leaving this subject, that I am uncertain whether this insect is the destroyer of the American or of the European currant borer. Though there were several of the American borers in the currant stalk in which I met with them, the shrivelled remains of the worm from which these parasites came gave indications of its having been a Lepidopterous rather than a Coleopterous larva. Five of these parasitic worms had come from it, but of this number three were so weak and immature that they died without forming their cocoons.

We have only to state in conclusion, that the utter carelessness with which the currant is treated in most of our gardens, with a thicket of young shoots annually left unpruned and crowding upon and smothering each other, gives these borers and other pernicious insects the utmost facilities for lurking unmolested and pursuing their devastating work without interruption. Were this shrub suitably trimmed and kept thinned out to only three or four stalks from each root these stalks growing freely exposed to the light and air would be little if any infested by these depredating insects.

As these worms remain in the dead stalks through the winter their destruction is easily effected. By breaking off all the dead brittle stalks at the surface of the ground and burning them these borers may at once be exterminated from the garden. But they will soon find their way back again unless the bushes are well pruned every year.

135. EUROPEAN CURRANT BORER, *Trochilium Tipuliforme* Linn. (Lepidoptera. Trochiliidæ.)

Feeding upon the pith of currant stalks causing them to perish, a small whitish worm with a darker line along the middle of its back and a brown head and legs; changing to a pupa within the stalks, and the fore part of June giving out the perfect insect, which is a small moth having some resemblance to a wasp, its wings being clear and glassy, the fore pair opake yellowish at their tips, with a black margin and band near the middle, and the abdomen black with three yellow bands situated one upon each alternate segment. Width 0.65 to 0.85.

This insect, to which the common names of Currant hawk-moth and Currant clear-wing are given in English works will be more readily known in this country by the name which we have appended to it. A short history of it is given in Dr. Harris's Treatise, p. 255, under the name *Ægeria Tipuliformis*. The reason why the name *Trochilium* is now given to this genus, instead of *Ægeria*, has already been stated in connection with the Peach tree borer, No. 59. The name *Trochilium* means a little humming-bird, being a diminutive of *Trochilus*, the technical name of that genus of birds, and its appropriateness will at once be perceived by every one who has noticed one of these insects or their kindred of the Sphinx family hovering over flowers, the larger species having often been mistaken for humming birds.

136. WILD CURRANT BORER, *Trochilium caudatum*, Harris.

A worm similar to the preceding, boring in the stalks of the wild black currant (*Ribes floridum*) and producing a brown moth with tawny yellow neck, feet, antennæ and tail, which last in the males is nearly as long as the body. Width 1.00 to 1.25. See Silliman's Journal, vol. xxxvi, p. 311.

137. CURRANT MITE, *Tyroglyphus Ribis*, new species. (Aptera. Acaridæ.)

On diseased currant stalks, in the cavities which have been excavated by borers and under the loose bark, a minute mite scarcely the hundredth of an inch long and less than half as broad, white, shining, its head about half as broad as the body, the head and thorax forming a third of its total length.

Being met with sometimes in excessive numbers in those currant stalks which have been killed by borers, this minute creature merits a notice in connection with them, though we know not whether it should be ranked as an injurious species. Several of the insects of this family are known to be pernicious to the vegetation and the living animals which they infest. But our knowledge of their habits and economy is still so limited and imperfect that it is uncertain whether a large part of them are to be regarded as noxious or innocent. Many of them like the present species appear to be present in the situations where we find them in consequence of disease and decay already existing, and not as the cause of maladies in connection with which they occur. It is also probable that very many if not most of the species of mites which we have upon this side of the Atlantic are identical with those of Europe. One of the evidences of this is now fresh in my mind, and possesses sufficient interest to be stated in this place. A few years since I made a partial investigation of the insects which occur in diseased potatos. Among these I met with excessive numbers of mites, mostly pertaining to two different species. Within a few days past having received from M. Guerin Meneville his paper upon this same subject, published in the Bulletins of the Royal and Central Society of Agriculture, I observed that two species of mites were here described and figured. On comparing these figures with the sketches which I had heretofore taken, their coincidence was apparent on a moment's glance, rendering it evident that these two little creatures which resided in myriads in my own cellar were identical with those found in the same situation in the distant city of Paris.

The mite which occurs in diseased currant stalks, appears to be unlike anything which I find mentioned by authors. It has a considerable resemblance to the longer mite (*Tyrcglyphus longior*, Gervais) which has been discovered in company with the cheese mite in the rind of old cheese, but the head here is much larger and the thorax longer, so that the abdomen forms but two-thirds of the length of the insect. A slight but very distinct constriction separates the thorax from the abdomen and a more slight one divides the head from the thorax. The head is shaped like an egg and from its anterior end two small very short bristles project forward like little horns. Two longish bristles project backward from the tip of the abdomen, and there are two shorter ones upon each side of these and another standing directly outward upon each side of the abdomen towards its base. The legs are of equal length, rather slender and cylindric, each having near the tip a longish bristle standing outward. When walking the four hind legs are wholly hid as the insect is viewed from above.

Many hundreds of these mites may sometimes be met with in their winter quarters, heaped together in a mass in the lower end of the cavity which has been excavated by a borer. On bringing them into a warm room they immediately awake to life, all moving their legs but showing no disposition to separate and crawl away.

138. AMPUTATING BROCADE MOTH, *Hadena amputatrix*, new species.* (Lepidoptera. Noctuidæ.)

The latter part of May, severing by night the young succulent stalks of currants, roses, &c., a cut-worm 1.50 long, of a brownish or livid color, shining, with a chestnut-colored head and a horny spot of the same hue on top of the neck and of the last segment, and with faint dots symmetrically arranged, each yielding a very fine short hair. Burying itself about a month, the moth coming out in July, its fore wings rusty red clouded with gray and blackish, with the usual round and kidney-shaped spots near their centre large, pale gray or white, and beyond these spots a broad bluish-gray band parallel with the hind margin and not reaching the outer edge, this band margined on its hind side by tawny yellow followed by a wavy white line extending across the wing and ending outwardly in a large gray spot which occupies the tip. Colors and marks sometimes dull and obscure, sometimes bright and distinct. Width 1.80.

This is one of our most common night-flying moths. Having been found arranged with British species in some old English collections it was supposed to be a native of that country and was described as such by Mr. Stephens, who conjectured it to be the species named *amica* by Treitscke. Now that it is so evident that this was an error it is improper to continue using this name for this species, and I therefore propose for it a new one having reference to the habits of the larva, this being the first characteristic which comes into the mind, commonly, when this insect is thought of. By this insect in addition to the borers above mentioned Nature endeavors to lop off all that redundancy of stalks which the roots of the currant produce and which man neglects to remove. See Harris's Treatise, p. 350.

APPLE BARK LOUSE, No. 15. I have occasionally seen the bank of both the garden and the wild currant crowded with these minute oyster-shaped scales, the stalks being commonly dead in consequence of their attack. A currant stalk thus excessively over-run may be seen in the Entomological Museum of the Society.

139. CIRCULAR BARK LOUSE, *Aspidiotus circularis*, new species. (Homoptera. Coccidæ.

On the bark of currant stalks in gardens of the city of Albany, early in the spring, I have observed a minute circular flat scale, only 0.03 in diameter, similar to a species named *Aspidiotus Nerii* but differently colored, being of the same blackish brown hue with the surrounding bark and having in the centre a smooth round wart-like elevation of a pale yellow color.

CURRANT. LEAVES.

140. CURRANT BARK LOUSE, *Lecanium Ribis*, new species. (Homoptera. Coccidæ.)

A hemispherical scale of a brownish yellow color, about 0.30 in diameter, adhering to the bark of the garden currant, its margin finely wrinkled transversely; often perforated with one, two or three holes, from which have issued minute brilliant green four-winged flies which in their larva state have fed upon and consumed the minute eggs which originally existed under these scales. This is quite common in some gardens, and I suspect has been introduced into this country with the currant, although European authors have made no mention of a scale insect as belonging either to this shrub or the gooseberry. It will be most readily found before the leaves put forth in the spring.

AFFECTING THE LEAVES.

141 AMERICAN CURRANT MOTH, *Abraxas? Ribearia*. Fitch. (Lepidoptera Geometridæ.)

About the middle of June, eating the leaves of the currant and gooseberry, in some gardens stripping the bushes entirely naked; a cylindrical ten-footed measure worm nearly an inch long, bright yellow varied on each side with white and with numerous black spots and large round dots regularly arranged, each giving out a fine black bristle, burying itself slightly and changing to a pupa without forming any cocoon; the moth coming out therefrom about the first of July, of a pale nankin yellow color, the wings with one or more faint dusky spots behind their middle in the male and in the female with an irregular band crossing both pairs. Width 1.30 to 1.45.

This is the most remarkable depredating insect which we have upon the currant in this country. It was fully figured and described in the Transactions of this Society ten years ago (vol. vii, p. 461), at which time it was much more numerous within the sphere of my observation than it has since been, although scarcely a year has passed but that some gardens might be seen with their currant bushes nearly or quite defoliated by it. It has been more numerous the present year (1857) than for several years before, and I learn from Rev. Wm. C. Reichel that in

Eastern Pennsylvania this same insect has this year totally consumed the currant leaves in several gardens. A letter from Lorenzo Rouse of Paris Hill, Oneida county, enclosing some of these worms in a vial of spirits and soliciting information respecting them, states that they were first noticed in that vicinity three years ago, and that they have continued to increase since that time, stripping the leaves from the gooseberries first and then from the currants. Our wild gooseberry (*Ribes Cynosbati*) was probably the original habitat of this insect, for I have noticed the moth around that bush, growing in the angles of fences, in years when none were observed in gardens; and perhaps one of these bushes set in an infested garden would allure most of these insects to it and render their destruction more easy than when they are scattered. Where these insects once establish themselves they there remain. The same gardens in my neighborhood which were most severely ravaged by them ten and twelve years ago are the ones in which they have been most numerous the present year, notwithstanding that in some of the intervening years these gardens have appeared to be nearly or quite free from them.

Mr. Rouse states that he has applied lime, ashes, soot, snuff, tobacco water and whale oil soap suds to his bushes, but all to no purpose. Shaking the bushes and picking the worms off by hand and destroying them is probably the only effectual mode of exterminating them, as I have heretofore said. Choice varieties of the gooseberry and currant may be securely protected by wholly enclosing each bush in netting made of the cheap fabric used for musketo bars, or some similar material, every worm upon these bushes being previously dislodged.

142. PROGNE BUTTERFLY, *Vanessa* (*Grapta*) *Progne*, Fab. (Lepidoptera. Nymphalidæ.)

Eating the leaves the latter part of June, a gray worm 1.25 long with a white head and branching white prickles, their points black; the pupa hanging with its head downwards from the under side of a limb about twelve days and the fore part of July giving out a butterfly with scalloped wings, the hind pair black shaded into tawny yellow at their base where is two black dots, their under sides with a central silvery straight mark bent to an obtuse angle somewhat resembling the letter L. Width about 2.00.

CURRANT. LEAVES.

So long ago as the year 1781 Fabricius (Species Ins. ii, 93) described one of our American butterflies under the name *Progne*, this, in the fables of heathen mythology, being the name of a sister of Philomela who was said to have been changed into a swallow. The deeply notched wings of this butterfly, having some resemblance to the forked tail of a swallow, perhaps suggested this name to Fabricius. Figures and descriptions of this butterfly given by different authors since, have made it well known; but to this day we have remained unacquainted with the vegetation on which it is reared and the caterpillar from which it comes. In June last, two worms were sent me from J. M. Stevenson of Cambridge, one of the Vice Presidents of the State Agricultural Society, found with several others of the same kind feeding upon the leaves of his currant bushes. They proved to be the larvæ of the Progne butterfly, and I am thus able to give the complete history of this species. I have also met with this butterfly in thickets bordering on lowland meadows, where it had probably been reared upon the wild black currant growing plentifully in these situations. A caterpillar found upon elms is described by Dr. Harris as being the larva either of this species or of the Comma butterfly (*C-album=comma*, Harris.) It now appears beyond a doubt that it pertains to this latter species and not to the Progne butterfly under which it is placed. As the Progne is so intimately related to the Comma or White-C butterfly, and as this species feeds upon quite a variety of trees and plants, it is probable that further researches will show that the Progne is not restricted to the currant but subsists upon other kinds of vegetation also.

In very many of its marks no sensible difference exists between this butterfly and the White-C, and the collector who has but one of these species in his hands will be much perplexed to determine which of these names to give to his specimens, with only such brief and imperfect accounts as authors have commonly given to guide him. An exact description of each particular part of an insect is a valuable aid to the student in his researches, in every instance, and is specially required where different species are closely related. I have therefore endeavored to draw up such a description of this butterfly in its different stages as will serve to distinctly point it out hereafter to every one into whose hands it may come.

The larva is gray with two or three deep transverse wrinkles at each suture, the bottoms of which wrinkles are black and their summits whitish. On the fore part of each of the abdominal segments is a whitish band which on each side is interrupted by two oblique black spots. Each of these segments also has a pale tawny yellow spot above the breathing pore and a smaller one below it, with prickles placed in each of these spots. The head is white with black dots, and is very rough from numerous short white spines of different sizes, and placed upon its summit are two black prickles with numerous branches which are mostly white with black tips. The two upper prickles upon the second ring are also black like those upon the head, those upon all the other segments are white, mostly with black tips, their branches white, towards the forward end of the body becoming tipped with black more and more. The first ring or neck is destitute of long branching prickles and has only a belt of short spines around its middle, similar to those covering the head. A few similar spines also occur upon the sides of the following segments and on the outer face of the pro-legs. The legs and pro-legs are dull pale reddish, their outer sides black. The mouth is dull reddish and the under side of the body white mottled with brownish dots and short lines.

From this description it will be seen that in its larva as in its perfect state this species is intimately related to the White-C. The Progne however has but one brood each year, the butterflies appearing in the month of July. The two larvæ which were sent me were found on the morning of June 29th to have cast their skins and assumed their pupa form the preceding night, one of them suspending itself from the stalk of a leaf, the other attaching itself to the side of the net in which they were inclosed. And on the morning of July 11th both were found changed to butterflies, the pupa state thus lasting but twelve days. Dr. Harris reports having obtained a Progne butterfly so late as the eighteenth of August, its pupa state having continued but eleven days. The few instances in which I have met with this butterfly have all been in the month of July.

The PUPA is 0.80 long and of a gray color with obscure olive clouds. It has a deep excavation across the middle of its back in which on each side of the middle is a burnished silvery-golden spot and outside of these spots is a blackish streak at the margin of the wing-sheaths. On the opposite side of the body and above this excavation is another similar excavation, at the base of the venter and tips of the antennæ-sheaths—these excavations giving to the pupa a very humped and deformed appearance A broad dusky olive stripe in which the breathing pores are placed, extends along each side of the abdomen and is edged on its front side with a narrow white stripe, and on its opposite side is an elevated black point upon each segment. Along the middle of the back is a whitish stripe which becomes double towards its lower end, and on each side of this is a dull olive spot on each segment with an obtuse elevated point outside of each spot. The lower end or head is deeply notched so as to form a somewhat conical point on each side, resembling a pair of horns.

The BUTTERFLY measures across the spread wings from 1.90 to 2.30. Its *fore wings* are of a bright tawny orange color, sometimes paler tawny towards their tips or over their whole surface. Their hind border is black, commonly freckled with yellow or gray scales on its outer half. Along the forward edge of this black border is a row of seven faint crescent-shaped spots of a paler yellow color than the ground, the second one from the inner margin largest, and those next to the outermost one oval rather than crescent-shaped and commonly with a black dot more or less distinct, placed upon their forward ends. Forward of these pale crescents is a dark rust-red spot upon the inner and a larger one upon the outer margin. A large somewhat square black spot is placed forward of this last one, upon the apex of the discoidal cell, which spot becomes dark rust-red towards its outer end and sometimes does not reach the outer edge of the wing. Upon the disk are five smaller round black spots, the three forward ones in a transverse row, of which the two outer ones are placed in the discoidal cell and nearer to each other and are often smaller and deeper black than the other three, which form a longitudinal row inside of and parallel with the middle vein. The outer margin and hind part of the inner margin is black irregularly alternated with grayish white. At its base the outer margin is strongly contracted or obliquely excavated instead of being straight or merely rounded inward as in other species. The hind margin is irregularly scalloped or wavy along its edge, with a more or less deep rounded excavation in the middle, at the outer end of which is a projecting prominent angle which is commonly acute. The fringe is black with whitish alternations between the projecting teeth. The inner margin is also strongly excavated or arched. The *hind wings* are black gradually shaded into rusty-red across their middle and here often showing short transverse black lines, the basal portion tawny orange with a wide blackish margin and two round black spots, the inner one smaller and tapering anteriorly to a point. In the black ground forward of the hind margin is a row of pale yellow dots, those towards the inner margin more faint and often obliterated. The hind edge is scalloped and wavy, with a deep round excavation between the middle and the inner angle, on each side of which is a projection resembling a short tail which is rounded at its apex and of a bluish gray color. *Under side* dark gray with numerous irregular transverse streaks of black, dusky and brown, giving the surface a peculiar curdled appearance like that of the fabric called "chene cloth." The fore wings are crossed posteriorly with a broad paler gray irregular band, which is widened at its outer end into a large hoary white patch occupying the whole apex of the wing. In the centre of the hind wings is a silvery-white mark which is bent at an obtuse angle in its middle with the two ends straight. This mark is variable, being sometimes slender through its whole length, sometimes twice as thick at its lower end as at its upper; its lower part is commonly shorter but is sometimes of the same length with the upper portion; the angle is sometimes but little obtuse, the mark then closely resembling the letter L; the concavity sometimes faces the hind margin near the outer angle of the wing, and sometimes opens towards the outer margin forward of this angle, this last variety being described as a distinct species under the name of *C-argenteum* by Mr. Kirby. An irregular wavy interrupted streak of brilliant green-blue scales extends across the hind wings forward of their hind border and is continued half way across the fore wings. This streak is irregularly margined with black and fades to faint green, and in some individuals can scarcely be discerned, especially upon the hind wings. The *body* is black with a brilliant green-blue reflection to the thorax and is clothed with tawny yellow hairs. The antennæ are black and alternated along their sides with white, and wholly white beneath, the knob being black and its tip straw yellow.

Though this butterfly has been met with from the latitude of Lake Winnipeg to the southern West India islands, and from the Atlantic to the Pacific coast, it does not anywhere appear to be numerous, and will probably seldom if ever occur in our gardens in such profusion as to do any appreciable injury. Indeed most persons will desire to cherish and protect these pretty "winged flowers," and domesticate them as much as possible in the yards around their dwellings, rather than to destroy and expel them. Although their larvæ covered with prickles have a repulsive aspect, they all disappear from the currant bushes before we have occasion to go near them to gather their fruit. Should these worms however become so numerous in any instance as to be detrimental, picking off each leaf on which they are stationed and crushing it beneath the foot will probably be found the only effectual mode of destroying them.

143. WHITE-C BUTTERFLY, *Vanessa* (*Grapta*) *C-album*, Linn.

Eating the leaves the fore part of August, a prickly worm very similar to the preceding, but of a brownish red color in front and white or pale yellow posteriorly, its pupa state continuing about sixteen days and the butterfly appearing in September, its wings scalloped, the hind pair tawny yellow shaded to dusky brown on their hind margin and with a black spot on their centre as well as two others towards their base, and on their under sides with a central sivery curved mark like a letter C. Width about 2.00.

Like the *Vanessa Antiopa*, *Atalanta* and several other butterflies, this species is common to both sides of the Atlantic. Dr. Harris regarded our American insect as different from the European, and accordingly named it *V. comma*. He supposed the wings to be more deeply scalloped or indented in the European than they are in the American butterfly and that the specimens of the two continents could at once be distinguished by this mark. But how perfectly fallacious this character is will appear from the remarks of Mr. Westwood (Humphrey's British Butterflies, p. 50) who, in describing the European insect observes, "This species is subject to an extraordinary variation in the form of its wings. In some specimens the incision in the outer (posterior) margin of the fore wings is so deep that it forms nearly a semicircle, whilst in others it is scarcely more than a sextant; the other indentations being equally varied." Our American specimens vary in the same manner, the principal incision in the fore wings being much deeper than the sixth part of a circle in every instance which I have before me. And on comparing them on the one hand with the descriptions which European authors give of *C-album*, especially that of Mr. Westwood which is most detailed and clearly expressed, and on the other hand with the description which Dr. Harris gives of *comma*, every one must admit that, of the two, the former is plainly the species to which our insect pertains. In every particular they coincide most perfectly with the characters assigned to that species. And when in addition to this we recur to their habits, the larvæ subsisting upon the same kinds of vegetation and two broods coming out each year, not a peg remains on which to hang a doubt as to the identity of our American insect with that of Europe.

In England this has obtained the common name of the Comma butterfly, and Dr. Harris describes it as having a silvery comma beneath, upon the middle of the hind wings. But in each of the several examples which have come under my notice this mark very exactly resembles a letter C and not a comma. A translation of its technical name will therefore designate it more explicitly than the common name which we meet with in English books. In all its marks except those which we have specified above, it is nearly or quite identical with the Progne butterfly. The under side of its wings, however, are occupied only in places by transverse black streaks.

The larvæ have as yet been noticed in this country only upon the hop and the elm; but in addition to these it in England has been found feeding upon the nettle, gooseberry, currant, honeysuckle, hazle and willow, and will probably be found upon the same vegetation here. The hop appears to be the plant of which it is most fond.

Two broods of this butterfly come abroad each year, the one in May, and the other mostly in September. Degeer has remarked that it probably passes the winter in the perfect state, as specimens are observed in the first days of spring. I once met with it on the nineteenth of April, before warm weather had sufficiently advanced, it would seem, to have disclosed it from the pupa that season. And as the black Antiopa butterfly is occasionally met with torpid in its winter quarters, beneath a board or in the cavity of a decaying log and similar situations, where, though for months buried deeply under the snow, it will remain dry and in safety, to come abroad from its solitary cell upon the first warm days of spring, so it is quite probable some individuals of this species also, hatching from their pupæ late in autumn may go into winter quarters and reappear upon the wing early in the following spring. But these can only be regarded as exceptions to the general rule, for it is not till the beginning of May that we commonly meet with this butterfly. I have captured it much oftener than the preceding species, although it is probably no more common. It falls into the collector's hands more frequently, as it comes abroad twice in the season and makes its first appearance when there are but few insects to be gathered.

The CECROPIA EMPEROR MOTH No. 33, in its larva state a very large pale green worm with blue and yellow prickles, is occasionally found upon the currant eating the leaves.

The WHITE MILLER No. 125, its larva a large caterpillar covered with soft pale yellow hairs, feeds upon the currant leaves also.

144. PALE HISPA, *Uraplata pallida*, Say, (Coleoptera. Hispidæ.)

Blister-like spots upon the leaves, in which is a small tapering flattened worm, feeding upon the green pulpy substance of the af leaving the skin entire, producing a beetle which occurs upon the bushes in May and June, its wing covers of an oblong square form with elevated lines and intervening rough grooves, its color light yellow, black beneath and with the antennæ, the sides and two stripes on the thorax and variable lines on the wing covers also black. Length 0.15. As I have commonly met with this beetle upon the wild black currant, I infer with considerable confidence that its larvæ subsist upon the leaves, mining them as the Rosy Hispa No. 37 does those of the apple.

145. CURRANT APHIS, *Aphis Ribis*, Linn. (Homoptera. Aphidæ.)

Irregular bulges or blister-like elevations of a brownish red color upon the leaves, opposite which on their under sides are corresponding hollows occupied by multitudes of plant lice sucking the juices of the leaf and sometimes covering the green succulent young shoots also; many of them without wings and of a pale yellowish color; others with clear glassy wings, and these mostly black with the abdomen light green and having a slightly protruded tail and black horns or honey tubes reaching about half way to the tip, with a row of deep green or black dots along each side forward of the horns, the antennæ and legs also black with the shanks and bases of the thighs pale, and with the third oblique vein of the wings obliterated at its commencement. Length 0.13 to the tips of the wings. More or less common in every garden, attended by ants and devoured by lady-birds (*Coccinellæ*) which are always seen on the same bushes, and which with other destroyers often wholly exterminate these lice so that only the bulged spots on the leaves remain to indicate their having been there.

146. OBLIQUE-STRIPED LEAF-HOPPER, *Erythroneura obliqua*, Say. (Homoptera. Tettigoniidæ.)

Puncturing the leaves and sucking their juices, a very small white leaf-hopper 0.12 long, its head and thorax with two bright blood-red or orange stripes and three short oblique ones on the wing covers, the outer one placed on the shoulder, the middle one on the disk and the inner one ending on the middle of the inner margin. This is common, particularly upon the bushes of the wild currant, but occurs on various other shrubs and trees throughout the year. Even in winter on turning over an old log one of these pretty little insects will sometimes leap into view from among the surrounding dead leaves. It is subject to considerable variations, the stripes being sometimes of a pale yellow color and one or another of them wanting Commonly three black or dusky dots may be seen on the wing covers in an oblique row forward of the membranous tips.

The COMPANION LEAF-HOPPER of the raspberry, the THREE-BANDED LEAF-HOPPER 105, and several other species of this group will also be met with upon currant bushes.

---

11. THE GOOSEBERRY.—*Ribes Grossularia.*

Most of the insects which are found upon the currant are equally common upon the gooseberry, though the stalks of this shrub are so well defended by prickles that they are rarely if ever invaded by those borers which are so pernicious to the currant. In addition to the insects which are named under the currant, the following have been observed upon the gooseberry only.

147. GOOSEBERRY BARK-LOUSE, *Lecanium Cynosbati*, new species. (Homoptera. Coccidæ.)

On the stalks of the wild gooseberry (*R. Cynosbati*), a hemispheric, smooth, shining resin-brown scale, commonly freckled with dull yellow dots and with a dull yellow stripe along its middle. Length about 0.15. This is evidently a different species from that which we have found upon the currant.

148. MEALY FLATA, *Pœciloptera pruinosa*, Say. (Homoptera. Fulgoridæ.)

In July and August, puncturing and sucking the juices of the leaves and the young succulent shoots, a four-winged fly which is strongly compressed and wedge-shaped, its height almost double its width, of a dusky bluish color covered with white meal-like powder, its legs straw-yellow, and its wing-covers showing some faint white dots and near their base three or four dusky ones. Length about 0.30.

Ten years ago a gooseberry and pie-rhubarb growing contiguous to each other in the yard in rear of the old State Hall in Albany were thronged with this insect in the different stages of its growth. This is the northern-most point where it has yet been discovered. The preceding year the privet (*Ligustrum vulgare*) in gardens in the city of New-York was overrun with it, and a description of it was published in the New-York Farmer and Mechanic newspaper, of July 30, 1846, by Issachar Cozzens, under the name *Flata Ligustrum*, he being unaware that it had previously been named by Mr. Say. Further south it is quite common on various shrubs.

149. Gooseberry moth. (Lepidoptera. Tineidæ ?)

The fruit when about half grown perishing, its interior being ate out by a slender greenish worm about half an inch long with a dark colored nose, a dark band across the top of its neck, and the three forward pairs of feet of the same color, which forms a tube of silken threads from the cavity in the berry through a hole in its side to an adjacent leaf, through which it crawls out and in.

This is too interesting and important a depredator upon the gooseberry to be passed unnoticed, although I have not yet obtained it in its perfect state, it having generally completed its work and left the bushes before its destructive operations were observed. I have sometimes seen bushes of the wild gooseberry with every berry withered and reduced to a mere dry hollow shell with a cobweb-like tube protruding from the orifice in one side. And the present summer a letter to the Country Gentleman from E. Graves, jr. of Ashfield, Mass., states that for three years past, his "Houghton's seedling" gooseberries have been a total failure, from this same worm, as I am assured by the account which he gives of it and the specimens accompanying his letter.

150. Gooseberry midge, *Cecidomyia Grossulariæ*, Fitch. (Diptera. Tipulidæ.)

The berries turning red prematurely and becoming putrid, and having in them small bright yellow maggots of an oblong oval form and slightly divided into segments by fine impressed transverse lines; changing to pupæ in the berries and the latter part of July giving out a small two-winged fly resembling a musketo, of a beeswax-yellow color, its wings hyaline and slightly smoky, and its antennæ blackish and twelve jointed. Length 0.10. See Transactions, 1854, p. 880.

12. THE HICKORY.—*Carya alba et al.*

The several species of hickory and walnut are all preyed upon alike by the same insects with a very few exceptions, and these trees suffer much more from their attacks than any of our other wild fruit trees. In the state of New-York are upwards of sixty insect depredators belonging to these trees. Only a part of these, however, are yet known to us in their perfect state so that we are able to name and describe them.

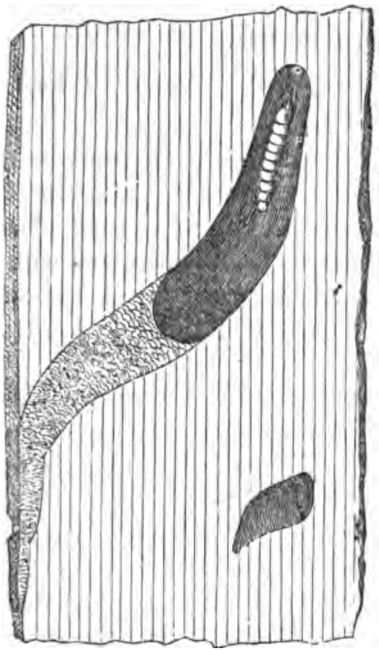
AFFECTING THE TRUNK AND LIMBS.

151. Tiger Cerambyx, *Goes tigrina*, Degeer. (Coleoptera. Cerambycidæ.)

Boring large holes lengthwise in the solid wood, a large cream-yellow grub, slightly tapering, with a faint darker line along the middle of its back, a black head chestnut-brown at its base, and the first ring flattened and pale tawny yellowish; changing to a pupa in the burrow it excavates (as do all other borers of the beetle kind), and producing a long-horned beetle of a brown color covered with incumbent short tawny gray pubescence, more dense on the wing covers, which have a broad dark brown band beyond their middle and another on their base. the thorax with an erect blunt spine on each side, and the antennæ pale yellowish with their first joint dark brown. Length about one inch. This is the common borer in all the hickory and walnut trees in my neighborhood. Those species of the old genus *Monohammus*, in which the feelers are blunt instead of pointed at their ends, have recently been set off into a distinct genus by Dr. Leconte, to which the name *Goes* is given. See Transactions, 1854, p. 850.

The annexed cut handsomely illustrates the principal operations of this insect; and those of the Apple-tree borer and other large borers belonging to the family Cerambycidæ are closely analogous to this. On the left hand side of the figure near its lower end is seen a small cavity which the parent beetle gnaws through the hard dead outer layers of the bark, and a small perforation through the soft new inner layers. Does the parent drop her egg in the bottom of the cavity which she gnaws, and does the young worm eat its way through the soft inner layers to the

HICKORY TRUNK.



wood? or does she bore through these layers with her ovipositor and place her egg under the bark and upon the outer surface of the wood? The Apple-tree borer deposits her egg upon the outside of the bark, according to the observations of Esq. Baldwin, as related in my first report (Transactions, 1854, pp. 717, 718). But according to the statements of my esteemed fellow townsman, Wm. McKie, Esq., who has had the misfortune of having much experience with this insect, the results of which were communicated by him to the Horticulturist, published at Rochester, a few years since, the parent insect pierces through the bark and places her egg in contact with the wood. It is probably impossible to decide from an inspection of the perforation in the bark, whether it has been made by a minute worm which has gnawed its way through the bark, or has been pierced by the boring apparatus of the parent insect. It is only by seeing the egg in place before it is hatched, or by finding the infantile worm on its way through the bark that this point can be settled. The young worm lives at first upon the soft outer layers of the sap wood, mining a shallow cavity all around the orifice in the bark, and the bark dies and turns black as far as this burrow extends. Its jaws having at length become sufficiently strong, it gnaws its way into the solid wood from the upper part of its burrow under the bark, boring obliquely inward and upward, all the lower part of its burrow being commonly packed with its saw-dust-like chips. Finally, having completed its growth, it extends the upper end of its burrow outward again to the bark, as shown in the cut heretofore given, Transactions, 1854, p. 851, which cut illustrates, on a diminished scale, the exit of this insect from the tree, as the one herewith presented shows its entrance and the lower part of its burrow, of the natural size.

152. Belted Cerambyx, *Cerasphorus balteatus*, Degeer. (Coleoptera. Cerambycidæ.) [Plate 1, fig. 8.]

A worm similar to the preceding and boring the trunk in the same manner, producing a more flattened long-horned beetle of a dusky brown color with a short dull straw-yellow band placed obliquely forward of the middle of each wing cover, and with a small sharp spine on each side of the thorax and two slender ones on the tips of each wing cover. Length 0.60 to 1.10. See Harris's Treatise, p. 86.

All our American authors have entered this species under Drury's name *cinctus* or the still later name *garganicus* of Fabricius. Although it was figured and described in Drury's first volume, the name was not given till the appendix of his second volume was published. The name given it by Degeer (Memoirs, vol. v. p. 111) thus appears to have preceded all others.

It is difficult to decide upon the most suitable common name for many of our insects. In those instances where the generic name is long and difficult of pronunciation by persons not classically educated, and where this name cannot readily be translated, I have deemed it better to fall back upon the family name, thus following the example of recent English authorities in the smaller Lepidoptera and several other groups.

153. Discoidal Saperda, *Saperda discoidea*, Fab. (Coleoptera. Cerambycidæ.)

A similar but much smaller worm than the foregoing, changing to a cylindrical long-horned beetle of a black or blackish-brown color, clothed with ash-gray pubescence which is less dense above and commonly forms three gray stripes upon the thorax and a band or crescent upon the middle of the wing covers, its legs being yellow or reddish. Length 0.40 to 0.60.

154. Banded Saperda, *Oncideres cingulatus*, Say. (Coleoptera. Cerambycidæ.)

A worm similar to the preceding and producing a similar beetle but distinguished chiefly by having its wing covers sprinkled over with faint tawny yellow dots. Length about 0.60.

HICKORY. TRUNK.

155. SLENDER-FOOTED DYSPHAGA, *Dysphaga tenuipes*, Haldeman. (Coleoptera. Cerambycidæ.)

Small grubs in the dead limbs and twigs, producing in May a small black long-horned beetle with rough wing covers but half as long as the abdomen and tinged with paler yellowish at their bases, its head having a furrow in the middle and its thorax cylindrical. Length 0.25.

156. LURID BUPRESTIS, *Dicerca lurida*, Fab. (Coleoptera. Buprestidæ.)

Mining shallow burrows in the sickly dying limbs, a long tapering yellowish white grub, its second ring very broad and strongly flattened, its head small and brownish, producing a blackish brassy snapping-beetle which may be found upon the trunk and limbs through the summer, its surface rather rough and with coarse punctures running into each other, its wing covers with raised lines on their inner part and two toothed at their tips, the end of the abdomen having three teeth and its under side being more brilliant brassy and with punctures opening backward. Length about 0.70. See Harris's Treatise, p. 43.

157. WALNUT ANT, *Formica Caryæ*, Fitch. (Hymenoptera. Formicidæ.)

Mining long narrow passages in the interior of the trunk and limbs and staining the adjacent wood light brown; a longish black shining ant, its abdomen with equidistant transverse rows of fine bristles, two rows upon each segment. Length 0.20 to 0.33. See Transactions, 1854, p. 855.

158. RED-SHOULDERED APATE, *Apate basillaris*, Say. (Coleoptera, Bostrichidæ.)

Boring small holes straight towards the heart of the tree, small fleshy white six-footed grubs with backs transversely wrinkled; changing to pupæ at the inner ends of their burrows, and producing small cylindrical black beetles covered with punctures, with the fore part of their thorax very rough and their wing covers with a tawny red or yellow spot on their base, their tips abruptly cut off obliquely, the margin of the declivity showing two or three little teeth on each side above and an elevated line below. Length 0.20 to 0.25. See Harris's Treatise, p. 81.

AFFECTING THE BARK.

159. Four-bristled mite, *Oribata quadripilis*, new species. (Aptera. Acaridæ.)

Under the loose scales of the bark, a broad oval mite of a shining resin-brown color and slightly transparent, with four small bristles projecting forward in front. Length 0.02.

Though our knowledge of the habits of this mite is very limited and we are not able to say whether it is an injurious species, it still merits a short notice in connection with the other insects which occur upon the bark of the hickory. The Hickory ant which has been mentioned above, in addition to occupying cavities in the interior of the tree is met with also under the loose scales of the bark, in which situation numbers of them may be found crowded together and torpid, in the winter season And associated with it a small mite will frequently be found, which appears to be closely related to the *Oribata bipilis*, described by Hermann from specimens discovered upon the bark of a tree in Germany. This mite is oval and about half as broad as long, somewhat depressed, polished and shining, of a resin-brown color and slightly transparent like resin. It has in front four projecting bristles of nearly equal length, the lower two curving inward, the other two straight, and a few bristles occur scattered over the body. The legs are also clothed with hairs of unequal length, and at the tip of each shank is a long bristle extending outward over and projecting beyond the feet. The four anterior thighs also have a shorter bristle at their tips, projecting outward parallel with those of the shanks. The four anterior legs are of equal length and somewhat longer than the hind ones, and the articulating part of their base is very narrow and slender. Their thighs are of an elongated ovate form, being strongly inflated into a kind of knot at their bases. In the winter season little groups of these mites are found clustered together in the crevices of the bark, torpid, but reviving when brought into a warm room and thereupon crawling about, though very slowly and awkwardly, the long bristles protruding out beyond the ends of its feet evidently serving to aid it in clinging to the surface over which it walks but at the same time impeding it from any briskness in its movements.

HICKORY. BARK.

160. HICKORY BARK-LOUSE, *Lecanium Caryæ*, new species. (Homoptera. Coccidæ.)

Fixed to the bark of the small limbs, a large, very convex oval scale of a black color fading to chestnut-brown, in May dusted over with a white powder. Length often 0.40 by 0.25 in width.

161. HICKORY BLIGHT, *Eriosoma Caryæ*, new species. (Homoptera. Aphidæ.)

The under sides of the limbs particularly of bushes and young trees in shaded situations coated over with a white flocculent down, covering and concealing multitudes of woolly plant-lice which are crowded together upon the bark, sucking its juices; the winged individuals of a black color, with the head, scutel and abdomen covered with a white cotton-like substance, their wings somewhat hyaline, the forward pair with an oval salt-white spot or stigma towards the tip of their outer margin, their veins all very faintly traced or abortive. Length to the tip of the wings 0.12.

I have never noticed this blight in the state of New-York, though it no doubt occurs here. It was found common upon walnut bushes growing along Henderson river in Illinois, a few years since.

162. HICKORY APHIS, *Lachnus Caryæ*, Harris. (Homoptera. Aphidæ.)

In clusters on the under sides of the limbs in July and August and probably to the close of the season, puncturing the bark and extracting its juices, an unusually large plant-louse, 0.25 long and to the tips of its wings 0.40, its spread wings measuring 0.72, its body of a black color coated over with a bluish white powder like the bloom upon a plum, its antennæ reaching to the base of the abdomen, black and evenly bearded with shortish hairs, as are the legs also, the thighs being clear tawny red; wings hyaline, smoky at base and along the outer margin, their veins black, the rib vein and two first oblique veins very thick and margined with smoky, the third oblique vein and its two forks and the short fourth vein very slender. See Harris's Treatise, p. 208.

This species clearly pertains to the genus *Lachnus* as now restricted and admirably elucidated in the invaluable volume of Koch.

AFFECTING THE LEAVES.

1. *Forming galls and other excrescences.*

163. Hickory-stem gall-louse, ***Pemphigus Caryæcaulis***, Fitch. (Homoptera. Aphidæ.)

? Forming bullet-like galls, hollow, green and of a leathery texture, upon the leaf stalks and succulent young shoots, with the walls of the cavity inside covered with minute white and yellow lice; the perfect, winged insect not yet discovered; the gall subsequently turning black, opening and becoming cup-shaped. See Transactions, 1854, p. 859.

164. Hickory-vein gall-louse, ***Pemphigus? Caryævenæ***, new species.

Forming plaits in the veins of the leaves, which project up from the surface in an abruptly elevated keel-like ridge upon the upper side of the leaf and with a mouth opening on the under side, the lips of which are woolly and closed.

Although the Aphis which produces these plans in the veins of hickory leaves is unknown to us in its winged state, its work will suffice to distinguish it from other species. The plaits occur mostly near the middle of the leaf, upon one side of the mid-vein, occupying the bases of the lateral veins, two or three of which are commonly enlarged into these excrescences or galls, which jut up in keel-like ridges from a quarter to a half inch in length. These ridges are of a pale yellow color, turning brown and becoming dry and dead after a time, and frequently before they perish the portion of the leaf between them withers and turns brown, in which case the inhabitants of the gall forsake it, being no longer able to obtain a due supply of nourishment from its walls. The lips of the mouth which opens on the under side of the leaf are covered with white or pale tawny yellow wool. They are pressed together, but a small orifice is open at their outer end, through which some of the young lice frequently crawl from the interior of the gall and station themselves upon the under surface of the leaf by the side of the mid-vein. The lips are readily drawn apart, exposing the cavity within, the walls of which are covered with minute wingless females and their eggs and young. The females are egg-shaped, broadest anteriorly and tapering behind to an acute but not an attenuated point. They are 0.03

long, 0.02 broad, very pale yellow and at the tip watery white. The eyes appear like two minute brown dots widely separated, the head being short and broad with the transverse sutures between it and the other segments of the body very slight and indistinct. The legs and antennæ are short and tinged with dusky. The antennæ are three-jointed, the basal joint thickest and about as broad as long, the second joint globular and the third elongated and cylindrical, with a projecting point upon one side at the tip. When moving about the antennæ appear to be employed as a fourth pair of legs, their points being pressed to the surface over which it is passing, similarly to the feet. The eggs are small oval shining grains of a watery yellowish white color. The young larvæ are intermediate in size between the eggs and the females, and resemble the latter except that they are of an oval form and their beaks are proportionally longer reaching to or slightly beyond the tips of their bodies.

These excrescences are common upon hickory leaves throughout the summer season.

165. Hickory Thrips, *Phlœothrips Caryæ*, new species. (Homoptera. Thripididæ.)

Slender conical protuberances like the spur of a cock a quarter of an inch long, standing out perpendicularly from the under surface of the leaf and closed at their end, with a similar protuberance upon the opposite side of the leaf having its end open and split into several long slender teeth; within these galls a small slender shining black insect with the middle joints of its antennæ honey-yellow and its long narrow white wings appressed to its back.

Whether these singular galls, which resemble a long slender pod thrust half way through the leaf, are produced by the Thrips found in them, or by some other insect which forsakes them before this takes up its abode there, I am unable to say. In the instance in which I noticed them particularly, they occurred upon a young shag-bark hickory in the month of September. Quite a number of the leaves had one and several had two or more galls growing upon them, in each one of which was one or more of these insects or their larvæ. The galls were of a very tough leathery texture, green where they adjoined the leaf and deep purple at their ends, though most of them at that date had become dry and faded to a dark brown color. The leaf is often wrinkled around the gall and has more or less of a fold extending from thence to its outer edge. The insect within, when disturbed, turns its tail upward over its back in a menacing manner, the same as the rove beetles (*Staphylinidæ*) do; and when the point of a needle which has been pressed upon one of these insects is touched to the tip of the tongue, unless my imagination greatly deceives me, it will frequently be found to impart a peculiar acrid biting sensation. This insect is 0.07 long, of a deep black color and highly polished. Its head is narrower than the thorax and nearly square. The third, fourth and fifth joints of the antennæ are longer than the others, yellow and slightly transparent; the last joint is shortest and but half as thick as those which precede it. The abdomen is egg-shaped with its tip drawn out into a tube thrice as long as it is thick, with four long bristles at its end, and the abdomen is furnished with bristles at each of its sutures. The wings do not reach the tip of the abdomen. They are white and slightly transparent and fringed with black hairs. In its larva state it has a more slender linear form with a dull greenish yellow head, a white thorax with a broad black band anteriorly, a pale red abdomen with a black band at its tip, and whitish legs.

166. HICKORY LEAF WITHERER, *Phylloxera Caryæfoliæ*, new species. (Homoptera. Aphidæ.)

Forming small conical elevations on the upper surface of the leaf, each having an orifice in its summit; a very small black plant-louse with a pale abdomen and legs and smoky wings laid flat upon its back, and having only three veins in addition to the rib. Length 0.06.

The protuberances formed by this plant-louse are about 0.15 high and 0.20 broad at their bases, of a conical form and a dull red or lurid brown color surrounded by a light yellow ring which occupies the substance of the leaf for a short distance around the base of each cone. The apex of the cone is fimbriated or cleft into a number of small teeth which turn outwards, and in the centre between the bases of these teeth is a small orifice leading into a cavity inside of the cone, the walls of which are scarcely thicker than paper, but are very tough like leather. Some leaves have only one of these conical galls upon them, others have two, three or more. As many as a dozen may be found upon some leaves. And wandering about upon the surface of the leaf the mature winged flies will be found, which have crawled out from the gall in which they were nurtured, and in which multitudes of young lice in all the stages of their growth will be found crowded together and covering the walls of the cavity, with a few newly hatched winged individuals similar to those seen outside of the gall, but smaller and lighter colored, the whole of their body being pale yellow or with only a dusky band between the bases of their wings. As soon as they leave the gall, however, and expose themselves to the light and air, they change to a black color, the abdomen only remaining pale yellow often tinged with green. Some individuals may be observed in which the change in their colors is not fully completed, showing a pale yellow band upon their necks. Their legs are short and pale with black knees and feet. The antennæ are short, thick and thread-like, scarcely longer than the head, and with but three or four joints, difficult to discern. The wings are placed horizontally upon the back and not elevated as in most of the plant lice. They are smoky-transparent with a more dusky spot or stigma on the outer margin between the tip of the rib-vein and the outer edge, the rib-vein being perfectly straight and not curved as in other plant lice to give a greater width to this stigma-spot. In addition to the rib-vein the fore wings have only three oblique veins, all of which are straight and black. The first of these is placed forward of the middle of the wing and runs from the rib-vein to the inner margin. The last one runs from the stigma to the tip of the wing and is abortive or imperceptible at its base where it starts from the stigma. The middle vein is parallel with this last and starts from the first vein above its middle and reaches the inner margin equidistant from the tips of the other two, its base being abortive for a short distance. The hind wings form a very conspicuous angular point on the middle of their outer margin and have a longitudinal rib-vein but are wholly destitute of any oblique vein running from it to the inner margin.

From what has now been stated it will be seen that this small insect presents some notable peculiarities. We have a second species, belonging to the oak, which is perfectly congeneric with it. None of the figures in Koch's works correspond with these insects, and the genus to which they pertain is evidently unknown to him. But on gathering from different sources the details of the European plant-louse named *Quercus*, on which the genus *Phylloxera* has been founded by Fonscolomb, we find such a full coincidence as to assure us that our insects are congeneric with that species. We cannot but deem that the observation of M. Amyot (Ann. Soc. Ent. 2d series, v. p. 485), that in that species the three oblique veins arise directly from the outer margin of the wings, is inexact, as such a structure would be a perfect anomaly among the species of this family. Should that character, however, be as stated by M. Amyot, our insects would constitute a new genus, since in them the usual longitudinal rib-vein from which the oblique veins are given off is perfectly distinct.

2. *Puncturing the leaves and sucking their juices.*

167. HICKORY GAY-LOUSE, *Callipterus Caryellus*, Fitch. (Homoptera. Aphidæ.)

Scattered upon the under sides of the leaves, a small pale yellow plant-louse with white antennæ alternated with black rings and pellucid wings laid flat upon its back, its abdomen egg-shaped, somewhat flattened and with only minute rudimentary honey tubes. Length 0.12. See Transactions, 1854, p. 869.

This and the four following species of very small delicate bright-colored plant-lice inhabiting hickory leaves were described in my First Report, at which time I remarked that they with other similar insects occurring on oaks and other trees formed a group so very distinct from the common species of the genus Aphis that they would probably be regarded as entitled to the rank of an independent genus. The same year in which that Report was published the portion of M. Koch's beautifully illustrated work (Die Pflanzenlause Aphiden) in which a few European species similar to these is given, made its appearance. These insects are therein formed into a new genus, to which the name *Callipterus*, i. e. beautiful winged, is given. And the European *C. Juglandicola* of Koch appears closely related to this present species, though sufficiently distinguished from it by the black rings upon the antennæ, which are always broad in our insect and are one of the first marks which the eye notices, but are represented as quite narrow and inconspicuous in the European. This is common upon hickory leaves; but the insects of this genus do not crowd themselves together and remain stationary like other plant lice

168. DOTTED-WINGED GAY-LOUSE, *Callipterus punctatellus*, Fitch.

A plant-louse like the preceding, but with black feet and a black dot on the base and another on the apex of each of the veins of its fore wings. Length 0.12. See Transactions, 1854, p. 869.

169. SPOTTED-WINGED GAY-LOUSE, *Callipterus maculellus*, Fitch.

A plant-louse like the preceding, but with the veins of the fore wings margined in part with smoky and a black band near the tips of the hind thighs, the black rings upon the antennæ narrow. Length 0.12. See Transactions, 1854, p. 870.

170. SMOKY-WINGED GAY-LOUSE, *Callipterus fumipennellus*, Fitch.

A plant-louse similar to the preceding, of a dull yellow color with blackish feet and the wings smoky with coarse brown veins. Length 0.13. See Transactions, 1854, p. 870.

171. BLACK-MARGINED GAY-LOUSE, *Callipterus marginellus*, Fitch.

A plant-louse similar to No. 166 but with a black stripe along each side of the head and thorax, and on the outer margin of both pairs of wings. Length 0.15. See Transactions, 1854, p. 870.

172. FRECKLED LEAF-HOPPER, *Jassus irroratus*, Say. (Homoptera. Tettigoniidæ.)

A cylindric oblong white leaf-hopper closely inscribed and reticulated with slender black lines and small dots which form irregular spots along the margins of the wing covers, its legs white dotted with black. Length 0.25. Whilst several of its kindred draw their nourishment from grass and growing crops of grain this very common species is usually found upon the leaves of a variety of bushes, oftener upon those of the walnut and hickory than any other kind, according to my observations.

HICKORY. LEAVES

173. FOUR-STRIPED LEAF-HOPPER, *Tettigonia quadrivittata*, Say. (Homoptera. Tettigoniidæ.)

A flattened oblong leaf-hopper of a light yellow color, varied on the thorax with orange, red or dusky, its wing covers olive green each with two bright red or orange stripes, the tips margined with black. Length 0.35. This pretty insect, like the preceding, occurs upon a variety of other bushes in addition to the walnut.

174. WALNUT SWORD-TAIL, *Uroxiphus Caryæ*, Fitch. (Homoptera. Membracidæ.)

A dull brown tree-hopper with the terminal portion of its wing covers obscure ash-gray, its abdomen and a ring on its shanks pale yellowish, and its breast mealy white. Length 0.30, the female 0.37. This is a somewhat common insect, which I have found only upon the walnut.

175. ONE-COLORED TREE-HOPPER, *Telamona unicolor*, Fitch. (Homoptera. Membracidæ.)

A tree-hopper of a uniform dull ochre yellow color and somewhat like a beechnut in shape and size, with a prominent hump jutting up on the middle of its back, highest anteriorly and descending with a slight curve to its hind angle which is very obtusely rounded and but little prominent, its anterior angle also rounded and with only a slight concavity below it at the forward end of the hump, whilst at its posterior base is a strong one, the whole surface with close coarse punctures and showing a few elevated longitudinal lines low down on each side and towards the tip; the upper edge of the hump black and also the tip of the abdomen on its under side; wing covers glassy with a black spot on their base and tip and their veins margined with slender black lines. Length 0.45, height 0.25. A variety (*irrorata*) occurs, of a paler grayish yellow color freckled with numerous pale green dots in the dried specimen. This is a rare species which I have only met with in a few instances, always finding it on walnut bushes.

HICKORY. LEAVES.

176. Banded tree-hopper, *Telamona fasciata*, Fitch.

A tree-hopper resembling the preceding in its form, but smaller and of a tawny yellow color, its head and the anterior margin of the thorax and the under side paler cream-yellow or straw-colored with a single small black dot above each eye ; its thorax in front and at tip blackish and also an oblique band across the hind end of the dorsal hump and a spot on the tips of the wing covers ; the dorsal hump more long than high, longer at its base than above, highest anteriorly, with a stronger concavity at its anterior end than at its posterior and at its anterior base compressed and forming hereby a shallow indentation upon each side. Length 0.38, height 0.20. This is also a rare insect, and as in kindred species, the black colors are often partially or totally obliterated, except the black dot above each eye.

The V-marked tree-hopper (*Smilia vau*, Say), an extremely common and variable species is sometimes met with upon walnut bushes, but belongs to the oak, on which it is always found in abundance.

177. Short-horned tree-hopper, *Ceresa brevicornis*, new species. (Homoptera. Membracidæ.)

This is so similar to the common Buffalo tree-hopper No. 22, that it will scarcely be distinguished from it except by a practiced eye, although it is undoubtedly a distinct species. It differs from that in having the horns much more short, and the sides of the thorax when viewed in front are not gradually curved outwards but are straight or rectilinear with the horns abruptly projecting from the corner at the upper end of this line. The acute spine at the tip of the thorax is also more long and slender. The thorax between the horns is slightly convex. The dried specimen is of a pale dull yellow color freckled with faint pale green dots and with a paler straw-colored stripe, quite distinct, upon the angular sides of the thorax from each eye upward to the horn and from thence to the summit of the thorax. Length of the female 0.36. It was met with upon hickory bushes in New-Jersey.

178. Face-banded Cixius, *Cixius cinctifrons*, new species. (Homoptera Fulgoridæ.)

A small four-winged fly of a white color varied with blackish brown and with three elevated lines upon the face and thorax, its face snow-white crossed by two black bands, the outer raised lines dotted with white in these bands; the thorax black, tawny yellow on each side beyond the raised lines; neck white with a row of blackish dots upon each side; wing covers smoky-brown, their veins dotted with black in places, their basal edge, an oblique band and a spot on the middle of the outer margin white, their membranous tips white and somewhat hyaline, with a brown band across the transverse veinlets and the hind margin blackish interrupted by the snow-white tips of the veins; wings black and transparent; under side yellowish-white with two blackish bands on each of the four forward shanks. Length of the male 0.18. This was taken in company with the preceding, the middle of September. It may possibly be a variety of the *Flata nava* of Say, much more colored with black than in the specimens from which his description was drawn.

179. CLOUDY-TIPPED CIXIUS, *Cixius colæpeum*, new species.

A small four-winged fly of a coal-black color with clear transparent wings having a large smoky-brown cloud on their tips; wing covers transparent, their veins dotted with black, the dots on the outer margin larger; an irregular and somewhat broken band of a smoky brown color extending across forward of the middle and a broader one beyond the middle, having a black spot or stigma on the anterior corner of its outer end; between these bands a smoky brown spot on the inner and a smaller one nearly opposite it on the outer margin; thorax with three raised lines; face black with the raised lines brown; legs dull whitish. Length 0.22. This also is a rare species.

AMYOT'S OTIOCERUS, No. 110. In each of the few instances in which I have met with this insect it has occurred upon walnut bushes.

The LARGE GREEN TREE BUG No. 99, is a common species upon hickory as well as on several other trees.

3. *Eating the Leaves.*

180. LUNA MOTH, *Actias Luna*, Linn. (Lepidoptera. Bombycidæ.)

In August, a large thick-bodied worm three inches long or more, of an apple-green color and its under side of a deeper or leaf-green hue, each segment with six small bright rose-red elevated dots, and low down along each side a pale yellow line running lengthwise immediately above the lower row of dots, from which line at each of the sutures a pale yellow line extends upwards upon the sides and sometimes is continued across the back, the head and six forward feet pale bluish green; spinning a whitish tough oval cocoon with rounded ends, 1.75 long, with leaves moulded to its outer surface; dropping to the ground in autumn and lying among the fallen leaves through the winter, giving out the moth the latter part of May; this of a delicate pea-green color, its body coated over with soft white wool, with a brick-red band across its anterior part and continued outward upon the forward edge of the fore wings nearly to their tips; each of the wings with a smallish eye-like spot near the centre, and the hind pair with their inner angles prolonged into tails which are nearly as long as the wings. Width 4.50 to 5.50.

It is a remarkable feature in the Insect Fauna of this country that we possess such a number of large showy moths of the group Attacus of Linnæus. Though the insects of the United States are generally so very similar to those of Europe and in some of the families are identical in many of their species, we here observe a notable difference. Whilst that continent furnishes only the three kinds of Peacock, the Tau and the rare Cæcigena, species of moderate size and but little diversified in their appearance, we have in the State of New-York alone eight of these elegant moths, nearly all of them vieing in size and magnificence with the most superb tropical products of this kind; and of a moiety of these the two sexes are so very dissimilar that in the cabinet they appear to form twelve distinct species. We have already presented some account of the Cecropia, No. 33, the Promethea, No. 80, and the Io, No. 81, and we here come to three others the larvæ of which occur upon the walnut.

Many persons on looking at these splendid insects in my collection have been much surprised on being informed that they were captured here in the State of New-York and that they are not rare species. They are very seldom seen, as they fly only by night and repose during the day time, clinging commonly to the sides of trees in groves and forests. This present species is less ornately adorned and diversified in its colors than the others. Its peculiarly delicate modest appearance causes many to rank it as "pre-eminent above all our moths in queenly beauty," and renders the name bestowed upon it by Linnæus most appropriate and happy, Luna being the Latin designation of the moon, the "queen of the night."

I have met with this feeding upon the beech as well as the walnut, and at the south it is also found upon the persimmon and the sweet gum. Varieties of the moth occur in which the fringe of the wings is wholly yellow or pale green, but commonly it is more or less of a rich purple or brownish red color along the middle of the hind edge of each wing. Some specimens have the margin of the hind wings sinuated or wavy from the tails to the outer angles. And another variety shows a darker streak more or less distinctly, forward of the hind border and running nearly parallel with it, at least upon the fore wings.

A Chinese species named *Selene* by Dr. Leach is almost identical with our Luna moth. So far as appears from a single specimen of this, sent me from Ningpo by Rev. M. S. Culbertson, the two insects can only be distinguished from each other by some of the minor details in the colors of the eye-like spots in the centre of their wings; varieties of the Luna occur which seem to coincide with the Selene in every other point.

The eye-like spots in these insects are situated upon the apex of the discoidal cell, and the transverse veinlet which bounds the outer end of this cell, forms also the centre of the eye-like spot. In Selene this veinlet has only a slight narrow hyaline margin, whilst in Luna its margin is widened into an elliptic glassy spot; the eye thus appearing to be half opened in the latter and closed in the former. This central pupil is bordered on its forward or upper side by a rose-red crescent in both insects, the anterior or convex side of which is margined by an ochre-yellow line in Luna which is wholly wanting in Selene Finally, in both insects this spot is surmounted by a coal-black crescent accompanied by a white or bluish-white line, which is placed upon the concave margin of the crescent in Selene, but inside of this margin in Luna, so that a black line here borders it upon its hind or concave side. On the opposite or under side of the central pupil in Luna is a broader and paler rose-red crescent than that upon the upper side, sometimes faded to a white color, and this is succeeded by a still broader sulphur-yellow one, whilst in Selene we see only a broad white crescent faintly edged exteriorly with yellowish. And outside of this in Luna is a slender black line prolonged from the horns of the anterior black crescent and forming with it a circular ring surrounding this eye-like spot whilst in Selene no such ring occurs. The spot on the fore wings is much narrower and of an elliptic form, but has all the parts of that upon the hind wings. In Selene this spot appears to be more distant from the fore margin of the wing than it is in Luna, and is destitute of the brownish red streak which we see in Luna extending from the outer corner of this spot obliquely forward to the border of the wing.

181. POLYPHEMUS MOTH, *Hyalophora Polyphemus*, Fab. (Lepidoptera. Bombycidæ.)

In August and the fore part of September, a large thick-bodied worm closely resembling that of the foregoing species, 3.50 long and of an apple green color, not darker green beneath but having a pale yellow stripe along the middle on its under side, and on each segment six bright orange conical points, three on each side, with a sulphur yellow stripe from the lower to the middle one of these points, except on the anterior segments, and the upper points sometimes silvery on their outer sides; its head and six anterior feet of a clay-yellow color; crawling along the under sides of the limbs with its back downwards, its body being too heavy to be sustained in an upright posture; when at rest and contracted each segment strongly humped and forming an angular transverse ridge; constructing a cocoon in all respects like that of the Luna moth, which gives out the perfect insect the middle or latter part of May; this of a dull ochre or brownish yellow color with a glassy eye-like spot near the middle of each wing, crossed by a slender line and margined by a yellow succeeded by a black ring, which last is much broader on the hind wings and on its forward part is widened into a large cap-shaped spot as long as wide, with its concave end shaded into a bluish-white crescent; a dusky band faintly margined with white on its hind side crosses both wings forward of their hind margin, beyond which the ground color is commonly paler; anterior margin gray, which color is continued from the wings across the thorax in the form of a band. Width 5.00 to 6.50. A specimen in the collection of I. A. Lintner of Schoharie is much the smallest I have ever seen, measuring only four inches across its spread wings.

I have met with the larva of this insect on walnut, butternut, thorn and linden or basswood, and Dr. Harris (Treatise p. 298) records its occurrence on oaks and elms also. It sometimes attaches its cocoon partly to the side of a limb or sometimes with its silken threads draws two or three twigs together sufficiently to tie its cocoon between them, in which cases it does not fall to the earth with the fall of the leaves in autumn, but is very apt, by remaining exposed in the tree, to be perforated and have its inmate destroyed by woodpeckers.

It is remarkable that two insects which are so similar in their preparatory states that their larvæ differ only by slight and unimportant marks and their cocoons cannot be distinguished from each other still come to be so unlike each other in their perfect state as is the present species and Luna. The fact shows that the metamorphoses of the insects of this order is not so accurate a guide to their correct systematic arrangement as many have assumed it to be. This species having wings without tails and with glassy spots in their disk will pertain to Duncan's genus *Hyalophora*, but as the type of this genus (*Atlas*,) has the glassy spots large and angular, whereas here they are small, round and eye-like, it should probably form the type of a distinct genus.

The larvæ of this species and Luna are naked, except that fine hairs scarcely perceptible to the eye are scattered over the surface, at least upon the back, and one or two bristles are given out from each of the elevated dots. But I have met with larvæ upon the hornbeam and the butternut which I supposed to be the Luna, in which both when young and mature the surface was covered with numerous erect clavate scales, like short bristles gradually thickened towards their tips. Whether the moths from these larvæ are in any respect different from those which come from naked larvæ I hope to ascertain from specimens which are now in their pupa state.

182. REGAL HICKORY MOTH, *Ceratocampa regalis*, Fab. (Lepidoptera. Bombycidæ.)

In autumn, a very large apple-green worm, the largest larva in our country, measuring five or six inches in length and nearly an inch in thickness, with blue-black spots and rows of prickles and anteriorly several long orange-yellow horns tipped with black and studded with numerous black prickles, four of the upper ones longest, the head and feet also orange-yellow; lying under the ground in its pupa state through the winter, the moth coming out the beginning of July, of a bright red color with two yellow stripes on the thorax, its fore wings olive grayish or lead-colored with red stripes on the veins and light yellow oval spots mostly in a row parallel with the hind margin, the hind wings paler red with their anterior outer border and a large irregular triangular spot on their inner side light yellow. Width 5.00 to 6.00.

The larva of this splendid insect feeds upon the butternut and sumach as well as on the walnut and hickory, and at the south it is common upon the persimmon also. Its large size and long horns with branching prickles give it a truly formidable aspect, from whence it has acquired the name of "The horned devil" among the negroes at the south. It may be handled, however, without harm, as its prickles do not possess the power of stinging which belongs to those of the Io larva; and this frightful looking worm eventually becomes one of the largest, prettiest insects of our country. It is rarely met with in our State and only in its southern part. Some of its eggs sent in a letter from Philadelphia by Mr. George Newman enabled me to rear this insect and observe its transformations, and from these the specimen of the larva in the Entomological Museum of the Society was obtained. When reared in a colder climate than that to which it is native it is retarded beyond its usual period in completing its transformations, and thus its young do not have sufficient time to attain their growth before the season closes. It is therefore impossible to naturalize this elegant insect in the middle and northern parts of our State. The eggs sent me hatched mostly upon the 22d of July, and placed upon the sumach, the thriftiest one of the larva finished feeding and buried itself the 8th of September, but it was not till the 25th of the following July that the moth made its appearance. The pupa lies naked in the earth, without forming any cocoon. It is about two inches long and three-fourths of an inch in diameter, with rather deep transverse furrows at the sutures and wholly destitute of any rows of minute teeth. It has a small round elevation at its tip, like the head of a nail, and from the centre of this elevation two small blunt points project. It is of a bluish black color and the inside of the shell after the moth has left it is of a pale blue color and nacre-like, resembling the mother [illegible] inner surface of a clam shell. When this moth first comes out it has a strong odor, exactly like that of opium, or the flowers of the poppy, and the pupa shell has the same smell also. It is common for the larger Lepidopterous insects when newly changed from their pupa state and before they take wing, to eject a few drops of an opake fluid, which is usually of a red color. In former times, before this fact was known, a whole brood of a particular species happening to come out on a single night in summer has so covered the leaves and grass with these drops over a wide extent of country as to lead to the confident belief that a shower of blood had fallen—a phenomenon which superstition would naturally regard as an omen of most alarming portent. The fluid emitted by the Regal hickory moth is of a milk-white color and of the consistence of thin paint, and it is more copious than in any other insect I have reared, a single individual ejecting over a table spoonful.

183. HICKORY TUSSOCK MOTH, *Lophocampa Caryæ*, Harris. (Lepidoptera. Arctiidæ.)

In July and August, eating the tender leaves at the tips of the limbs, companies of snow-white caterpillars with rows of large black dots, and along the top of their backs eight black tufts of converging hairs and two black pencils of longer hairs towards each end; growing to an inch and a half in length and in sheltered corners and crevices spinning ash-gray oval cocoons with rounded ends, which give out the moth the following June, this being a pale ochre-yellow miller, its fore wings with roundish white spots edged with tawny yellow rings, the hind ones often united together and forming two or three rows parallel with the hind margin. Width 1.70 to 2.10. See Transactions, 1854, p. 863.

This caterpillar has been unusually numerous the present year, 1857. It has been tenfold more abundant than it was two years ago when my account of it was drawn up. And it proves to be a more general feeder than has been hitherto supposed. Though it evidently prefers the walnut, butternut and sumach, it is common on the elm and ash also, and I have even met with clusters of these caterpillars upon the tamerack or larch. As they approach maturity they separate and stray off to other trees, and may then be seen on rose bushes, on the apple, oak, locust, &c., the same individual often remaining several days in one place.

It is not till the latter part of September that they finally disappear from the leaves.

The FOREST CATERPILLAR, a species resembling the Apple-tree caterpillar, No. 28, but making its nest against the side of the trunk instead of in the forks of the limbs, occurs on the hickory, but is more common on the oak, under which the description of it will be given.

The FALL WEB-WORM No. 88, and the V-MARKED MEASURE WORM No. 39, are also common upon the hickory. A singular shaped worm named THE SKIFF by Dr. Harris (Treatise, p. 323) and several other species belonging to the genera *Limacodes*, *Notodonta*, *Lophocampa*, &c., which are not yet known to us in their perfect state, also inhabit the hickory.

Of insects in their perfect state eating the leaves of the hickory, the large GOLDSMITH BEETLE No. 57, is the only one which has yet been noticed.

AFFECTING THE FRUIT.

184. HICKORY-SHUCK MOTH, *Ephippophora Caryana*, new species. (Lepidoptera. Tortricidæ.)

A slender white sixteen-footed worm about three-eighths of an inch in length mining the shucks which envelope the fruit, causing the nuts to be abortive and many of them to fall from the tree prematurely.

There are few persons who have gathered hickory nuts but have noticed this worm in some of the shucks and the cells which it has excavated therein, filled with little grains of a tawny yellow color. A specimen of the moth which comes from these worms, and the pupa shell from which it issued, was sent me by Mr. Lewis Potter of Easton, N. Y., in April last, with a letter stating that the insect entered its pupa state about the first of February and the moth came out the last of that month. This doubtless refers to the fruit when stored within doors, for larvæ which are lying on the surface of the ground, torpid or congealed by the winter's cold, undergo no changes.

The shell of the chrysalis or pupa is of a pale dull yellow color and shows upon each segment of the abdomen two rows of minute teeth with their points curved backward, those of each anterior row being larger.

The specimen of the moth being somewhat mutilated does not enable me to be perfectly certain respecting the genus to which it pertains, though everything indicates it to be an *Ephippophora*, of which genus we have several undescribed species in the State of New-York, some of them quite common. It is of a sooty black color, its fore wings with reflections of tawny yellow, blue and purple, their outer margin black with oblique triangular whitish streaks placed at equal distances apart, these streaks gradually becoming more faint anteriorly and disappearing for a short space at the base, and all of them except the last three double or in pairs separated only by a slender black line. A very oblique faint silvery blue streak extends inwards from the points of two of these white streaks, namely, the fourth and sixth ones from the tip of the wing; and the usual white spot on the inner margin of the wings in this genus is wanting in the present species. Its hind wings are silvery whitish on their outer basal half, the scales of the inner basal portion having a blue and a gray reflection, and their fringe is bluish white. The face and fore breast is cream-yellow, the hind breast and base of the abdomen hoary white, the third and following segments of the abdomen coal-black. Width of the spread wings, 0.60.

Mr. Potter states that in his own neighborhood this insect had been common for a few years and became so numerous in 1856 that several of the hickory trees scarcely produced a single nut. The present year, 1857, all our native fruit trees have yielded an unusual abundance of fruit, and I have not been able to find one of these worms whereby to render this account of them more exact. It is quite probable that, like many of its kindred, this moth will be numerous at times, and will then suddenly disappear, being destroyed by parasitic enemies, by unfavorable seasons, or other causes. Picking up and burning the infested nuts is probably the only mode whereby we can diminish its numbers.

185. LONG-BEAKED NUT WEEVIL, *Balaninus nasicus*, Say. (Coleoptera. Curculionidæ.)

A weevil with its remarkably long slender beak drilling a hole in the nut when it is young and soft and placing an egg therein, the worm from which feeds upon the meat and causes the fruit to fall, the worm finally boring out of the nut and burying itself in the ground to pass its pupa state, the beetle appearing in July and again the latter part of September, of a dark brown color coated over more or less with rusty whitish scales or short flat hairs, forming spots on the wing covers, which have punctured furrows, the thorax being black and densely punctured, the shanks chestnut-brown and the beak as long as the body and no thicker than a coarse bristle, polished and of a chestnut-brown color with a blackish tip, straight to its middle and from thence curved to its tip. Length 0.30 to 0.33 exclusive of its beak.

Worms seldom occur in hickory nuts in the State of New-York, but are common in them at the west. We meet with worms much more frequently in hazelnuts, chestnuts and acorns. A few attempts which I have made to rear some of these worms have been unsuccessful, nor was Dr. Harris any more fortunate in his efforts. Hence we are not certain as to the species which infest these respective fruits. Dr. Harris (Treatise, p. 65) states that he has met with this weevil upon hazelnut bushes. I have found another species similar to this upon the hazelnut, but have met with this species only upon the hickory at a distance of more than a mile from where any hazelnuts were growing. It appears probable, therefore, that this insect is not limited to one kind of nuts. The diseased hickory nuts show a small discolored spot upon their outer surface, and with a magnifying glass a round hole can be seen perforated in the centre of this spot, but closed up slightly within the nut. The meat inside is more or less eaten and the cavity thus made is filled with little brown and whitish grains, among which the worm is lying. It is a soft white grub, wholly destitute of feet, like the other larvæ of the weevil family.

The PLUM WEEVIL No. 70 is said by Mr. Say, on the authority of Wm. Bartram, to sometimes destroy the fruit of the walnut.

13. THE BLACK WALNUT.—*Juglans nigra.*

The LOCUST-TREE BORER (*Clytus Robiniæ*) is a common borer in the trunks and limbs of the black walnut, and the beetles which are reared in this tree appear to constitute a distinct variety of a larger size than usual and with their yellow marks changed more or less to a white color.

186. BLACK-WALNUT SPHINX, *Smerinthus Juglandis,* Abbot and Smith. (Lepidoptera. Sphingidæ.)

Eating the leaves, a large pale blue-green worm tapering in both directions from its middle and with a small head, a long horn at the end of its back and seven oblique white streaks along each side; when irritated making a creaking noise by rubbing the anterior joints of its body together; burying itself under ground through the winter and changing to a chestnut colored pupa with a rough granulated surface and six small tubercles upon its head; producing a narrow-winged moth of a drab gray, cinnamon-yellow or bluish lilac color, its fore wings crossed by four rusty brown lines, the two forward ones transverse the two hind ones parallel with the hind margin, and with a large square rusty brown spot on the middle of the inner margin between the two middle lines. Width 2.25 to 3.00. See Silliman's Journal xxxvi, p. 292.

14. THE BUTTERNUT.—*Juglans cinerea.*

AFFECTING THE TRUNK AND LIMBS.

187. SPOTTED LEPTOSTYLUS, *Leptostylus macula,* Say. (Coleoptera. Cerambycidæ.)

Under the bark of old decaying trees, a grub similar to that of the Prickly Leptostylus No. 4, changing to a pupa in its cell and early in July giving out a small thick long-horned beetle of a brown or chestnut color with the sides of its thorax and a band on its wing covers ash-gray, the latter sprinkled over with coarse punctures and large blackish dots, the thorax on each side of its disk with a black stripe interrupted in its middle. Length 0.25

to 0.30. The bark of old trees will sometimes be found everywhere filled with these grubs, which in the month of June may be seen changed to short thick pale-yellow pupæ with a few perfect insects that are newly hatched and have not yet left the tree.

188. BUTTERNUT BARK-LOUSE, *Aspidiotus Juglandis*, Fitch. (Homoptera. Coccidæ.)

Fixed to the bark of the twigs, minute pale brownish scales resembling those of the Apple bark louse No. 15, but smaller and not curved. This species was alluded to in my first report, Transactions of 1854, p. 739. I have not yet had an opportunity to trace out its history. Although this is so minute that the naked eye can scarcely discern many of the scales, it is preyed upon by a parasitic larva still smaller, which resides under the scale and feeds upon the eggs which the scale covers, changing to a minute four-winged fly of the family *Chalcididæ* in the order *Hymenoptera*, which gnaws a small round hole in the side of the scale through which to make its escape.

189. BUTTERNUT SCALE INSECT, *Lecanium Juglandifex*, new species. (Homoptera. Coccidæ.)

Adhering to the bark on the under side of the limbs, a hemispheric dull yellowish or black scale about 0.22 long and 0.18 broad, notched at its hind end, frequently showing a paler stripe along its middle and a paler margin and transverse blackish bands.

Whether this is the same insect with the European *Lecanium Juglandis* of Bouche, I am unable to ascertain, as I have at hand no description of that species. The details which I herewith present of our American insect will probably suffice to enable those who have an opportunity of observing that species to determine whether it is the same.

The male pupæ of this insect may be seen upon the limbs in May. They appear the same with the pupæ of other common species of this genus, being oblong oval, moderately elevated white scales about 0.10 long and half as broad, thin and somewhat hyaline, with a slender snow-white line running lengthwise along each side of the middle and uniting at their hind ends, with a similar line running transversely across the scale half way between its middle and its hind end. The male insects come out from these pupæ the fore part of June. They are long and narrow delicate two winged flies, measuring 0.05 to the tip of the abdomen and a third more to the end of their wings. They are of a rusty reddish color, the thorax darker and the scutel and head blackish, this last being separated from the body by a narrow pale red neck. The antennæ are slender and thread-like, half as long as the body, eight jointed, the basal joint thickest and as broad as long, the second joint narrower and scarcely longer than wide, the remaining joints cylindrical, the fourth slightly shorter than the others and the last rather longer than those which precede it. Two slender white bristles as long as the body are given off from the tip of the abdomen. The wings are transparent but not clear and glassy, and their rib-vein is very distinct and of a reddish color, ending before it reaches the margin of the wing.

The males of the several other species of the genus *Lecanium* which have been briefly alluded to in different parts of this Report will all be very similar to the one now described, differing only in their colors, the joints of their antennæ, and other minor points.

AFFECTING THE LEAVES.

190. TWO-MARKED TREE-HOPPER, *Enchenopa binotata*, Say. (Homoptera. Membracidæ.)

Puncturing the leaves and extracting their juices from July till the end of the season, a small rusty brown or black tree-hopper with two bright pale yellow spots upon its back, which part is prolonged forward and upward into a compressed horn rounded at its tip and giving the insect a resemblance to a little bird with an outstretched neck, and the four forward shanks broad, thin and leaf-like. Length 0.25 to 0.30.

This may always be found upon the butternut the latter part of summer. It occurs also, though less constantly, upon several other trees.

In my catalogue of Homoptera in the State Cabinet of Natural History, I referred this insect to the genus *Enchophyllum* of Amyot and Serville. Mr. Walker, I see, places it in the next genus, *Enchenopa*, of the same authors. It is too similar both in its form and spots to the Brazilian *Enchophyllum ensatum*[*] to be generically separated from that species. Indeed the distinction between the two genera is much too slight and vague, in my view, to justify their division. In some of the species which authors place under *Enchenopa* the thorax appears to be as distinctly compressed, thin and foliacious as it is in some of those arranged under *Enchophyllum.* The cells and veins of the wings are also the same in all these insects. It is therefore on good grounds that M. Fairmaire suppresses Dr. Burmeister's section *foliaceo-ensatæ*, the equivalent of *Enchophyllum* and includes all these insects under the one section, *ensatæ.* At the same time we view this group as too widely different and conspicuously marked by the horn-like protuberance of the thorax, to be retained under the genus *Membracis.* We would accordingly drop the name *Enchophyllum*, and include all these insects in the one genus *Enchenopa*, a term meaning sword-faced or sword-fronted, and which is therefore appropriate for all the species of this group.

191. BUTTERNUT TREE-HOPPER, ***Ophiderma mera***, **Say. (Homoptera. Membracidæ.)**

A greenish gray tree-hopper shaped like a half cone, with its apex bright chestnut-red and behind its middle a black band which is sometimes interrupted on the summit of the back, and with a blackish spot on the tips of the hyaline wing-covers. Length 0.36.

I have only met with this insect in a few instances, always upon the butternut. I could find no place for this species among the genera characterised by Amyot and Serville, and therefore proposed a new genus named *Caranota* in my catalogue of Homoptera in the State Cabinet of Natural History. This genus appears to be the same with that named *Ophiderma* by M. Fairmaire a few years before. The single species, *salamandra*, given as the type of this genus, is credited to the state of New-York, and according to the description is marked precisely like the *arcuata* of Say, but the dimensions assigned it are a fourth larger than those of that species.

---

[*] Upwards of a dozen individuals of this insect have fallen under my observation, all of which concurred in showing that it is the male sex which is described by Fabricius, whilst the females have been described by M. Fairmaire as a distinct species under the name *quinque-maculata*. A variety of the female occurs, which I name *intermedia*, in which the anterior spot upon the back is merely a faint cloud slightly paler than the ground, whilst the middle frontal spot is bright orange, as usual in this sex.

192. OBTUSE CLASTOPTERA, *Clastoptera obtusa*, Say. (Homoptera. Cercopidæ.)

A short thick almost circular leaf-hopper of a gray color with fine transverse wrinkles and three brown bands anteriorly, its wing covers clouded with tawny brown with streaks of white and a coal black spot near their tips. Length 0.22.

From the middle of July till the end of the season this insect may frequently be met with on quite a number of different trees and shrubs. Although the species of this American genus very much resemble those of the genus *Penthimia* they certainly pertain to the family Cercopidæ and not to that of Tettigoniidæ in which they are placed by Mr Walker.

193. BUTTERNUT TINGIS, *Tingis Juglandis*, new species. (Hemiptera. Tingidæ.)

Puncturing the leaves and sucking their juices, a small singular bug resembling a flake of white froth, its whole upper surface composed of a net-work of small cells, an inflated egg-shaped protuberance like a little bladder on the top of the thorax and head, the sides of the thorax and of the wing covers except at their tips ciliated with minute spines, the wing covers flat and square with their corners rounded, a large brown or blackish spot on the shoulder and a broad band of the same color on their tips with an irregular whitish hyaline spot on the inner hind corner; the body beneath small and black, the antennæ and legs honey-yellow. Length 0.14.

This insect becomes common on the leaves of the butternut in May and continues through the summer and autumn. It may sometimes be met with also on birch, on willows, and other trees. It corresponds with the *arcuata* of Say (Heteropterous Hemiptera, p. 27) in every respect, except that the outer margin of the wing covers is rectilinear and not arcuated or concavely excavated, and their veins are not ciliated with minute erect spines. I have never met with the *arcuata* in the state of New-York, but have gathered it from bushes in the outskirts of the city of Chicago.

Both species are very similar to the *Tingis rhomboptera* described in Fieber's excellent monograph of this family, and figured, plate 8 fig. 37, but that has a spot on the middle of the outer margin of the wing covers and their tips much less discolored with brown than in our insects.

194. BUTTERNUT WOOLY-WORM, *Selandria? Juglandis*, new species. (Hymenoptera. Tenthredinidæ.)

A worm remarkable for being enveloped and wholly hid in a thick coating of snow-white flocculent meal which falls off with the slightest touch, resides in companies on the under sides of the leaves, feeding upon them, in the month of July. It is of a cylindrical form, a very little tapering from its head to its tip, and has ten pairs of dull pale yellow feet, its body being of a blackish color and its head pale yellow and polished, with a large black dot upon each side. It has numerous transverse impressed lines and a groove on the middle of its back its whole length. The individuals I have examined were nearly half an inch in length. My attempts to rear them have proved unsuccessful. In one instance the leaf on which they were found was pinned to a leaf of a butternut growing in my yard, without disturbing them, but they refused to move from their original abode and perished as the leaf withered. They are evidently a species of saw-fly, pertaining there is scarcely a doubt to the genus *Selandria* and the sub-genus *Eriocampa*, thus named from its larvæ being covered with pruinose woolly matter.

The HICKORY TUSSOCK-MOTH No. 183, occurs about as frequently on the butternut as on the walnut, and two other caterpillars belonging to the same genus but which are not yet known to us in their perfect state are also common upon this tree. Other cater pillars and worms which have been observed feeding upon the leaves of the butternut are the larvæ of

The WHITE MILLER No. 125;
The FALL WEB-WORM No. 88;
The CECROPIA EMPEROR MOTH No. 33;
The POLYPHEMUS MOTH No. 181; and
The BLACK-WALNUT SPHINX No. 186.

15. THE CHESTNUT.—*Castanea vesca.*

AFFECTING THE TRUNK AND LIMBS.

We have never noticed any boring insect of a large size in the wood of this tree. But the durability of its timber, which is so highly valued, particularly for fence rails and posts, is much impaired by small insects which perforate it with holes that are only of sufficient size to admit the head of a pin, but which are often excessively numerous, and being pierced directly inward towards the heart of the tree become filled with wet from every shower. The decay of the wood is hereby greatly accelerated. These perforations are made by a slender cylindrical six-footed worm, half an inch long, of a white color and brownish yellow at each end, its apex cut off abruptly and obliquely and edged with small black teeth. The beetle that is produced from this worm is not yet ascertained.

Rails which have been pierced with pin-holes by this insect should always be placed in the fence with their sap side downwards, as it is upon this side that these holes mostly open.

195. TWO-TOOTHED SILVANUS, *Silvanus bidentatus*, Fab. (Coleoptera. Mycetophagidæ.)

Under the bark of logs and decaying trees, probably loosening the bark from the wood, a minute, narrow, flattened beetle, of a light chestnut-brown or rust-color, its thorax longer than wide, slightly narrowed towards its base and with a small tooth projecting outwards at each of its anterior angles. Length 0.10 to 0.12.

This is a European insect, which, like a kindred species, the Surinam Silvanus, has now become perfectly naturalized and as common throughout the United States as it is in its native haunts. On stripping the bark from recently cut logs of chestnut and of oak, this minute beetle, which is so flattened and thin that it can creep into the slightest crevices, will be found frequently in considerable numbers. We have several other insects which inhabit similar situations and are so much like this that a careful examination is requisite to determine their respective species. By the characters which are subjoined, in addition to those above stated, the Two-toothed Silvanus may be recognized.

Its head and thorax are often of a darker shade than its wing covers, especially in the moist living specimen. Its wing covers have rows of close punctures with a slightly elevated line between each alternate row. Its thorax also is densely and confluently punctured, and commonly shows a very faint elevated longitudinal line in its centre. The angles at its base on each side are obtuse, and from these angles forward to the projecting tooth the lateral edges are crenate-dentate, having sixteen little elevated tubercles or minute teeth jutting out at equal distances along the margin. The point of the large anterior tooth forms a right angle. Upon each side of the head behind the eye is also a minute tooth of the same size with those along the sides of the thorax. The surface is slightly clothed with minute inclined bristles.

In every group of these insects individuals will probably be found of the following *varieties:*—

a. bisulcatus. The basal part of the thorax with two shallow grooves. The few specimens which I have received from the south are all of this variety and have the grooves deeper and more distinct than they are in any of my New-York specimens. Erickson supposes this variety to be the *Colydium sulcatum* of Fabricius, but this can scarely be, since Fabricius characterizes that species as having the wing covers smooth and makes no allusion to any projecting teeth upon its thorax.

b. carinatus. A distinct elevated line upon the middle of the thorax its whole length.

c. planus. Thorax wholly destitute of a longitudinal line on its middle.

196. American white ant, *Termes frontalis*, Haldeman. (Neuroptera Termitidæ.)

Myriads of white ants mining in and wholly consuming the interior of fence posts and stakes whilst the outer surface remains entire.

This insect has received its scientific name in allusion, I suppose, to the deep notch which occurs in front upon the heads of the soldiers, but as many other species are notched in the same manner, I think the common name which I give it will be its most appropriate designation, since it is common all over our country, and is the only species of white ant which we have in the United States. The workers or larvæ which form much the most numerous portion of each colony of these insects, are 0.18 to 0.20 long, white and glossy, with pale brownish abdomens irregularly clouded with white. Winged individuals, supposed to be the males, make their appearance in the month of May.

They are of the same size with the preceding but are of a glossy black color, with the mouth, shanks, feet and tip of the abdomen pale yellow, and with four large wings which are twice as long as the body, and hyaline but not clear like glass. About the beginning of June, during the dampness of the mornings preceding pleasant days, these winged white ants leave their retreats and come abroad, and the air is everywhere filled with countless millions of them. The soldiers resemble the workers, but are 0.25 long with enormously large heads twice as long as wide and their opposite sides parallel, with stout jaws half as long as the head and of a blackish chestnut color.

Decaying stumps and logs lying upon the ground, especially those of pine and other soft wood, are everywhere occupied by these insects. The cavities which they excavate become thronged with myriads of them. Fortunately for us it is only soft damp wood in which they work; hence the dry timbers and furniture of our dwellings are exempt from that havoc which some of these insects occasion in tropical countries. But the posts and stakes of our fences furnish a congenial resort for them, that portion which is under ground being always sufficiently damp to answer their requirements. Posts in particular from which the bark has not been removed, whereby these creatures can remain hid from view whilst they consume the soft sap wood immediately under the bark, are a favorite abode for them. And as the sap wood becomes destroyed they extend their burrows through the more solid heart wood. I have seen a fence four years after it was built, every post of which was reduced to a mere shell by these insects, though externally there was not the slightest indication of the mischief that was going on within.

AFFECTING THE LEAVES.

197. CHESTNUT TREE-HOPPER, *Smilia Castaneæ*, Fitch. (Homoptera Membracidæ.)

Puncturing the leaves and extracting their juices, a triangular tree-hopper shaped much like a beechnut, of a blackish color, tinged with green more or less when alive, its head and the anterior edges of its thorax and all beneath bright yellow, its fore wings clear and glassy with a blackish spot on their tips and another on the base which is often prolonged along the middle of the wing and united with the hind spot. Length of the male 0.25, female 0.30. This is a common insect on chestnut leaves in the month of July, and I have never met with it upon any other vegetation.

198. UNADORNED TREE-HOPPER, *Smilia inornata*, Say.

A tree-hopper of the same size and shape with the preceding, but of a light green color fading to light yellow, with a slender black line along the upper edge of its back and a very slight duskiness on the tips of its glassy wings. This is quite common on the chestnut and on oaks from the beginning of July till the last of September.

The UNARMED TREE-HOPPER No. 64, is also met with on the chestnut in May and July, and at first sight appears identical with the preceding species. It may be distinguished from it by the hind end of its thorax, which is drawn out into a slender, sharp point, and its breast, which is black.

199. CHESTNUT GAY-LOUSE, *Callipterus Castaneæ*, new species. (Homoptera. Aphidæ.)

On the under sides of the leaves, puncturing them and sucking their juices in August and September, a small sulphur-yellow plant-louse, with black shanks and feet, its antennæ also black except at their bases and as long as the body, its wings pellucid, their first and second oblique veins and the tip of the rib-vein edged with coal-black, and its thighs straw-yellow. Length 0.09, to the tip of the wings 0.15.

This insect, in company with wingless larvæ and pupæ of the same color, may frequently be met with upon the under sides of chestnut leaves. The name "gay-louse," which is of the same import with the generic term *Callipterus*, and is the equivalent of the German name *zierlaus* which Koch applies to these plant lice, will be the most appropriate designation which our language furnishes for this and the other species of this genus, several of which have already been noticed in the preceding pages, (No. 20, 167–171.) Their bright, lively colors, and their long, slender antennæ and legs render them the prettiest objects belonging to the aphis family.

203. CHESTNUT LEAF-WITHERER, *Phylloxera? Castaneæ*, Haldeman. (Homoptera. Aphidæ.)

In August and September, on both sides of the leaves, puncturing them and extracting their juices and causing them to curl, a very small louse-like fly of a bright sulphur-yellow color with a black thorax, breast and eyes, its feet and antennæ tinged with blackish and its wings translucent. The wingless individuals associated with it are entirely yellow wiith red eyes.

I have never met with this species. The veins or nerves of the wings are described as follows: "First and third transverse nervures normal; second arising from the middle of the first and terminating in the normal position; posterior wings without nervures." From this description the veins appear to be essentially different from those of the genus *Chermes*, to which Prof. Haldeman refers this species. And I cannot but think that more exact observations will detect a rib-vein in the hind wings, and will show that this insect pertains to the genus *Phylloxera*.

The larva of the AMERICAN MAPLE MOTH (*Apatela Americana*, Harris), a large thick-bodied caterpillar two inches long and of a pale yellow color with two black pencils above on the fourth and sixth rings and a single one near its tip, feeds upon the leaves in August, but is much more common on the maple, under which head it will be described.

AFFECTING THE FRUIT.

One would suppose that the fruit of the chestnut, wholly inclosed as it is in a thick leathery bur, the surface of which is crowded with prickles with their needle-like tips pointing in every direction, was so effectually protected that no depredator could possibly reach it, or if attacked, we should think it could only be by some small insect panoplied like the rhinoceros, its hard shelly coat enabling it to encounter these prickles without harm. It is most wonderful, therefore, to discover that a little insect with a soft tender body, has the artifice of inserting its eggs at a particular point in the tip of this ball-like bur, where its young can penetrate inwards and subsist upon the fruit.

Dr. Harris (Treatise, p. 65,) speaks of a "weevil grub" as being very common in the chestnuts of this country. But the worm which I have met with in these nuts is the larva of a moth and not of a weevil. It grows to more than a half inch in length, and is cylindrical and thick, of a dirty white color with a tawny yellow head, and sixteen feet. It eats the meat of the nut mostly at its tip and on its convex side, the cavity which it makes being filled with little brown and whitish grains; and a small hole is perforated upon one side of the nut at its tip, out of which a portion of these grains are protruded. I have not yet succeeded in rearing this worm, and am therefore unable to give a description of the moth which is the source of this mischief.

16. THE HAZELNUT—*Corylus Americana.*

AFFECTING THE STALKS.

201. HAZELNUT BARK-LOUSE, *Lecanium Corylifex*, new species. (Homoptera. Coccidæ.)

On the under side of the stalks and branches, adhering to the bark, a smooth shining hemispheric scale of various colors, from pale dull yellow and deep tawny red to black, many individuals showing a paler stripe along the middle and others with transverse black bands, the surface often sprinkled over with projecting scales of a white wax-like substance. This is commonly small in size, being but about 0.14 in length, but some specimens are larger, measuring 0.20. A similar insect is common upon the European hazlenut, but is said to be of an orange-yellow color with red spots; I therefore infer it to be a different species.

AFFECTING THE LEAVES.

202. HAZELNUT TREE-HOPPER, *Telamona Coryli*, Fitch. (Homoptera. Membracidæ.)

Puncturing the leaves and sucking their juices the latter part of June, a triangular tree-hopper of a pale dull yellow color with a hump upon the middle of its back of the same shape as in the following species, with a rust-colored band occupying the anterior end of this hump and a curved one margined with black crossing its posterior end, the hind end of the thorax being also rust-colored, and the tips of the fore wings with oval blackish spots in the intervals between the ends of the veins. Length 0.32. Rare.

203. Sad tree-hopper, *Telamona tristis*, Fitch.

Extracting the juices of the leaves and succulent twigs in August, a tree-hopper of the same shape with the foregoing but of a much darker dull yellow or blackish color sprinkled over with pale dots and without any transverse bands; the elevated hump upon the middle of the back almost as high posteriorly as at its forward end, its upper edge straight and at the anterior end abruptly rounded, its hind end forming almost a right angle and its posterior base deeply excavated and forming the third part of a regular circle; an elevated polished black line along the middle of the thorax its whole length, with a few pale alternations, and widely interrupted with white in the excavation at the posterior base of the hump; one or two small hyaline spots in the upper edge of the hump; three black dots above each eye; a black spot on the tip of the wings; under side pale dull yellow. Length 0.35.

The Obtuse Clastoptera No. 192, and the Bound tree bug No. 100, also occur on the hazelnut, and its leaves are sometimes consumed by a large pale green worm, the larva of the Luna moth No. 180.

204. Elongated forked-claw, *Dichelonycha elongatula*, Gyllenhal. (Coleoptera. Melolonthidæ.)

Eating the leaves the latter part of May and in June, a narrowish cylindrical black beetle margined with chestnut brown, its wing covers shining yellowish-green margined with pale yellow, its under side pale yellow covered with short white incumbent hairs, and its legs pale yellow with the hind shanks except at their bases and the hind feet blackish. Length 0.33.

This is a common insect, usually found upon hazelnut bushes. It was first described by Fabricius in the year 1791, under the name *Melolontha elongata*, but Olivier had previously given this same name to a much larger South American beetle. It therefore became necessary to re-name this species, and we accordingly in the next record that is made of it (Schonherr's Syn. iii, 210), find the Fabrician epithet changed to *elongatula*. Thus the latter comes to be the legitimate name of this insect. Dr. Le Conte appears to have overlooked these facts and goes back again to the Fabrician name. In Dr. F. E. Melsheimer's Catalogue the genus *Dychelonycha* is credited to Dr. Harris. Dr. H. originally proposed the name *Dichelonyx* for this genus, but gave no description of it; and it is therefore to Mr. Kirby that we are indebted for this name and genus as it at present stands.

205. Linear forked-claw, *Dychelonycha linearis*, Gyll.

In company with the preceding, a beetle closely resembling it but slightly larger and having its thorax covered with short prostrate yellow hairs.

206. Back's forked-claw, *Dichelonycha Backii*, Kirby.

Occasionally found in company with the preceding, a beetle differing from it by having its antennæ and forward thighs blackish instead of pale yellow.

207. Green-striped forked-claw, *Dichelonycha subvittata*, Leconte.

Associated with the foregoing, a beetle resembling the elongated forked-claw, but having a shining deep green spot on the shoulder and another on the tip of each wing cover, these spots sometimes connected by a green stripe on the middle of the wing cover its whole length, and its hind shanks and feet not discolored with blackish. Dr. Le Conte credits this species to Lake Superior, but it is common also through Northern New-York and Vermont.

208. Hairy Attelabus, *Attelabus pubescens*, Say. (Coleoptera. Attelabidæ.)

Eating holes in the leaves in June and July, a short thick-bodied dull red or yellow weevil, its surface covered with short pale yellow prostrate hairs which are often rubbed off in places, and its breast black. Length about 0.20.

Mr. Say described this species in the year 1826, and it is probably since that date that Prof. Bohemann's name *Rhois* was published, which name moreover is inappropriate, as it indicates this insect to inhabit the sumach, whereas it is upon the hazelnut that it is uniformly met with. It is a common species, and sits upon the leaves in the posture of a dog, with its long fore legs braced outwards and elevating its head high above its body. Its larva probably subsists upon this shrub, but its habits are as yet unknown to us.

AFFECTING THE FRUIT.

209. STRAIGHT-BEAKED NUT-WEEVIL, *Balaninus rectus*, Say. (Coleoptera. Curculionidæ.)

A small yellowish drab-colored weevil with a long slender beak not thicker than a bristle and having the jaws placed at its tip with which it bores a hole into the nut when it is young and soft, and drops therein an egg which it crowds into the nut with its beak. A small white footless worm hatches from this egg, which feeds upon the meat of the nut and gnaws a small hole through its side, out of which when full grown it escapes and buries itself in the earth to pass its pupa state.

We are not certain as to the species of weevils which produce the grubs in our American hazelnuts, walnuts and acorns. As the Straight-beaked weevil has a long slender beak similar to that of the species which breeds in the hazelnuts in Europe, and as I have met with numbers of this insect upon hazelnut bushes the latter part of June, there can be little doubt but it was there for the purpose of depositing its eggs in the young fruit. Dr. Harris records the Long-beaked nut-weevil No. 185, as occurring also upon hazelnut bushes, and it may be that both these insects infest this fruit. They are much like each other, differing chiefly in their beaks, which in the present species is but half the length of the body and usually straight nearly to its tip, where it is curved downwards, but in some individuals it is slightly curved through its whole length, and is of a pitchy black color tinged in its middle with chestnut-brown. Its body is clothed with prostrate drab-yellowish hairs on a blackish rust-colored ground. These hairs often form a faint stripe on each side of the thorax, which also shows an obtuse elevated line on its middle. Its scutel is oval and ash-gray. Its wing covers have punctured impressed lines, and the hairs being rubbed off in places, irregular spots of a rusty color are produced. The under side is clothed with short prostrate ash-gray hairs, which are less dense upon the chestnut-brown legs. It measures 0.30 in length, exclusive of its beak.

SUPPLEMENT.

As stated in the introduction to the present Report, a few pages are here devoted to some of those insects which have come under my observation, which do not pertain to the noxious class but are yet too interesting on various accounts to be withheld from the public. The limits, however, to which I find myself restricted oblige me to omit several species which I had purposed noticing.

210. **Emasculating bot-fly,** *Cuterebra emasculator*, new species. (Diptera. Œstridæ.)

The history of this remarkable insect will be best presented by extracting from my manuscript notes the successive memoranda therein entered relating to this subject.

August 13th, 1856. Peter Reid of Lakeville informs me that his cat yesterday brought into the house a striped squirrel (*Sciurus striatus.*) On taking it into his hands he noticed its scrotum was enormously swollen and hard, with an orifice in it about the size of a wheat straw, and on pressing it with his fingers he could distinctly feel the writhings of something alive in this tumor. On enlarging this orifice with the point of a pen knife he discovered it was a large grub lying with its tail to the opening. It discharged at intervals three large drops of a fluid resembling grumous blood mixed with purulent matter. On pressing upon it so as to protrude the tail end of its body slightly out of the opening it exerted itself to crawl out, forcing its fluids into the part which was out of the orifice so that it became swollen and hard, and then regurgitating them into the body again, whereby the extruded portion became soft and collapsed, thus pressing upon and dilating the orifice, so that with three or four repetitions of this motion it worked itself out and dropped upon the floor. It proved to be a very large soft blackish grub with numerous paler spots. It was about an inch long and half as broad, oval, slightly depressed, divided into segments, with its surface covered with small, shining elevations resembling the granular surface of morocco leather. It had no feet or jaws that he could perceive. On showing him the figure of the larva of *Œstrus Bovis* in Westwood's Introduction, vol. ii, page 580, fig. 1, he recognizes a resemblance to that altogether more than to any of the other larvæ figured in that part of the volume. It seemed from its motions to be a formidable, ferocious creature. He put some damp chip dirt into a tin box and placed it thereon, it having been exposed to the air only about four minutes. It immediately worked its head down into the dirt and soon buried itself, evidently understanding what it was about. Mr. Reid brings this box and the squirrel to me. I sink the box in a flower bed in my yard and invert a glass tumbler over it. On examining the squirrel I find the fleshy glandular tissue of the testicles wholly consumed, nothing of them remaining but their empty outer skin. Mr. Reid says the fact is well known to hunters, that of the grey and other squirrels killed in this vicinity, at least one half of the males are castrated. It is the current opinion with them that this deformity is caused by the squirrels' seizing and biting out the testicles of their comrades, some of them strenuously maintaining that they have seen these animals engaged in this act. There are some hunters, however, that say they have found two grubs in the scrotum of some squirrels, and they conjecture that it is by these that the testicles are destroyed.

August 22, 1856. Mr. Hurst, Taxidermist of the State Cabinet of Natural History, informs me that on one occasion he saw a half dozen red squirrels (*Sciurus Hudsonius*) unite in mastering a gray one (*S. Caroliniensis*) and castrating him. He had so fair and distinct a view that there could be no mistake as to the fact, his eyes witnessing the very work in which the animals were engaged. *Query.* May it not be a flesh-fly which drops its egg into the wound of the castrated squirrel, from which grows the grub which Mr. Reid brought me?

September 1st, 1856. Mr. Reid brings me a striped squirrel with two grubs in its scrotum, considerably torn and injured by the coarse shot with which it was killed. These grubs are plainly the larva of a bot-fly and not of a flesh-fly. They are placed lengthwise in the scrotum, one forward of the other, producing a tumor nearly an inch and a half in length. Each worm has a cavity for itself, separated from the other, with an orifice towards its hind part, larger than the head of a large pin. Though the worms are probably immature the testicles appear to be entirely consumed, but the parts are so torn that I do not attempt to trace out the exact lesion which they have produced.

Of these two LARVÆ that which is least injured is 0.65 long and 0.44 broad. The other is smaller, being only 0.32 broad. They are oval, moderately depressed, more flattened beneath than above, rounded at one end and somewhat pointed at the other, of a coal black color and shining, the whole outer surface being covered with slightly elevated small hard angular granules, like shagreen, but without any projecting spines or teeth-like processes. The skin is remarkably thick and tough like leather, and the rough angular points with which it is covered must produce much irritation in the tumor, especially when the worm moves. It is divided into ten segments by deeply impressed transverse furrows, each segment forming a prominent ridge which is most elevated towards its hind edge. Towards the outer side each ridge is cut across by a conspicuously impressed longitudinal line, giving the worm a three-lobed appearance similar to that of a trilobite fossil. On the under side is an analogous impressed line, and between these at equal distances along each side are two others less deeply indented. The mouth does not show any jaws or other appendages externally but appears like a simple elliptic orifice placed transversely; and the perforation at the opposite end is similar. The specimens, however, are so mutilated that they do not afford a satisfactory examination. The worm is much like the figure in Westwood above referred to.

July 29th, 1857. I have repeatedly raised the tumbler to see if the worm buried last August had hatched, and began to despair of obtaining anything from it, when to-day, to my great joy, I find a large fly lying upon its back, dead, upon the surface of the dirt in the tin box, with the ends of its wings worn off from flying in its narrow prison, but perfect in every other respect. It proves to be of the bot-fly family (*Œstridæ*) and of the genus *Cuterebra* of Clark, thus named from two Latin words, *cutis terebra*, i. e. skin borer or skin piercer, this genus being distinguished by having the bristle of the antennæ feather-like or ciliated with a row of fine hairs along each side, and showing a distinct orifice at the mouth—several of the bot-flies being destitute of any opening at the mouth and taking no nourishment after they reach their perfect state. Nine species have been described by different authors as pertaining to this genus, all of them belonging to America save one which occurs in India. Nothing, however, appears to be known of the habits of the flies of this genus, except that the larvæ of two of them, which are found in the state of Georgia, reside under the skin of the rabbit. And this species appears to be different from any of those heretofore described. It is a large thick-bodied fly nearly three-fourths of an inch long, its head, thorax and abdomen of the same width, with the abdomen but little longer than wide and its smoky brown wings of about the same length with the abdomen and held together flat upon it. Its thorax is covered with whitish hairs which are more dense upon the sides, where is a large black dot. Its face is white with a large black dot upon each cheek, and the last segment of its abdomen is clothed with whitish hairs.

The dirt in the box had a depth of about two inches and the worm had penetrated to its bottom and there changed to a pupa, its outer skin becoming dry and hard and forming the outer covering or pupa-case of the insect.

This PUPARIUM is 0.80 long and 0.40 broad, nearly cylindrical, though flattened anteriorly in the region of the breast, and rounded at both ends. It is of a tough crustaceous substance, as thick and hard as the shell of a chestnut, and its whole surface is rough like shagreen, being crowded with elevated black shining points, to which a coating of dirt adheres as though it were glued thereto. It does not show any elevated transverse ridges, like those upon the larva, but six impressed lines or sutures are very perceptible, dividing it into seven segments which are mostly of equal length. The anterior one of these segments breaks off obliquely at its suture, to enable the fly to escape, the piece thus separated being a large roundish or egg-shaped scale, more broad than long, being 0.30 broad, and this scale shows upon its inner surface two curved elevated lines, which are sutures dividing it into three segments of nearly equal length; and at its anterior end is a small fourth segment marked by a strong depression in the surface. We thus find a total of ten segments in the pupa-case, the same number which we saw in the larva, those representing the head and thorax being much changed and soldered together into a single flattish piece instead of the circular rings which they formed in the larva. The small anterior segment has a wide shallow notch on its forward edge, on each side of which, exteriorly, is a round tuft or button composed of a mass of short pale yellow hairs evenly shorn at their tips and projecting out from the surface, and opposite these tufts on the inner surface is a small round spot of the same yellow color, formed of exceedingly fine lines radiating from the centre to the outer margin of the spot, which is bounded by an elevated ring or hoop which is also of a pale yellow color. From this description the entomologist will perceive that the pupa-case of this fly is analogous in almost every particular with those of many other insects of this order.

The FLY is a female and measures 0.70 in length to the tip of its abdomen and wings. Its *head* is black above, with close fine punctures, and is densely covered with short erect black hairs; its under side is brownish flesh-colored, closely punctured and clothed with white hairs which incline inward towards the mouth. Upon each cheek, below the eye and adjacent to the outer edge of its orbit, is a large shining black dot, in which the punctures are coarser and more distant from each other, and the space between this and the eye is darker brown. The antennæ are dark liver-brown and have a few whitish hairs overlying their bases, like eye-lashes. Their bristle is black at its base and the fine hairs with which it is ciliated are whitish. The cavity in which the antennæ repose has an ash-gray reflection, and on each side between this cavity and the eye is an elevated smooth shining space which is coarsely punctured. The *thorax* is black, finely punctured and clothed with soft hairs which incline backwards and appear of a tawny brown color when viewed from above but when seen from the side are white slightly tinged with yellow. Upon each side these hairs are much more dense, and half way from the wing-socket to the lower edge of the eye is a dot formed of black hairs. The scutel is black and clothed with black hairs. Beneath it on each side is a small yellowish-white dot, from which a short white line extends outwards. The *abdomen* is black, shining, densely punctured and covered with fine short hairs which incline backwards, those at the base being longer and those on the last segment tawny yellowish-white when viewed laterally but appearing black when seen from above. The segments are prolonged to the under side of the body, where their ends are of a glaucous grayish color with a large black dot upon each. The *legs* are black and covered with short black hairs, those towards the tip of the forward thighs on the hind side being yellowish white. The *wings* are smoky brown and imperfectly hyaline. At the base on their inner side is a large lobe of a square form with its corners rounded and its inner edge slightly concave. The winglets are blackish and opake with a narrow chestnut-brown margin.

A specimen of this same insect, sent me from west of Arkansas by William S. Robertson, varies in having the hairs upon the last segment of the abdomen much more dense, causing this segment to appear of a yellowish-white color, and the ends of the other segments are but obscurely tinged with gray without any black dot.

From what has now been stated I think that every one will agree with me in the opinion that it is by this fly that the squirrels in our country are emasculated, and that this remarkable fact in our Natural History which has hitherto been involved so deeply in doubt is hereby satisfactorily elucidated. But what are we then to think of the statement of Mr. Hurst, above related, and much other testimony of the same purport. The act which these persons aver that they have witnessed is so unnatural and so much at variance with everything which has been observed elsewhere in the domain of nature, that no scientific writer, that I am aware, has given any credit to these statements. Yet the testimony appears to be too explicit and positive to be wholly rejected. I am therefore led to believe that these animals do attack each other in the manner that has been stated; not, however, for the purpose of emasculating their comrades, as has been supposed, but for the purpose of coming at and destroying these bot-grubs, the enemies of their race. We know the terror which some of these bot-flies give to the animals on which they are parasites, and the efforts which such animals make to escape from them. The squirrel also is undoubtedly conscious that this insect is his greatest foe; he probably has sufficient intelligence to be aware that from the grub which is this year tormenting one of his unfortunate comrades, will come a descendant which next year may afflict him or some of his progeny in the same frightful manner. Hence his avidity to destroy the wretch and thus avert the impending calamity. Future observations must determine whether this conjecture is correct. We fervently hope that the sportsman or other person who next witnesses a squirrel overpowered by its fellows in the manner stated, will kill that squirrel and let the world know whether he does or does not find in it one of these grubs. If a grub is discovered, no doubt can remain as to the object of the other squirrels in making the attack which they do.

The fact has repeatedly been noticed of the squirrels in our country, that they sometimes become excessively numerous throughout a particular district, doing much injury to the corn and other crops of the farmer, both in the field and in the barn, and that they then suddenly disappear, so that scarcely one of these animals is anywhere seen. Writers on our Natural History adverting to this fact, say that their food becoming exhausted in the section of country where they are thus numerous, they migrate to other districts. But it now becomes altogether more probable that this sudden thinning in the ranks of these creatures is caused, not by their migration, but by their increase being suddenly arrested by this insect. Recently the field mice have been very abundant all over our country, and complaints were everywhere made of apple and other trees being girdled and destroyed by them in the winter of 1855–'56. The same causes which produced such unusual numbers of these vermin appear to have favored the increase of other small animals also. In my own vicinity at least, the squirrels, having been quite plenty in the preceding years, became unusally numerous last year, and from the readiness with which individuals containing parasites were then obtained, it is evident that the males were generally infested with these insects. The present year, sportsmen inform me there is a remarkable paucity in the numbers of these animals, not a quarter as many being now present in the forests as were found there a year ago. This diminution it can scarcely be doubted, has been occasioned by the insect of which we are treating. And whenever the squirrels are becoming multiplied these parasites will rapidly increase their numbers also. We know what a multitude of eggs a single bot-fly glues to the hairs of a horse's fore legs. If this squirrel-fly is similarly prolific what a host of these unfortunate animals will a single female mutilate, since she places only one or two eggs in each! By some mysterious instinct she undoubtedly knows whether a squirrel is already inoculated, and thus avoids consigning a single one of her progeny where it will be forestalled and unable to obtain the amount of nourishment which it requires. Hence, when the numbers of these insects become but moderately increased, as each female will be intently on the alert to dispose of her stock of eggs, it will scarcely be possible for a male squirrel anywhere to escape them.

Emasculated individuals are met with belonging to each of the species of squirrel common in our country. It is a fly bred from the striped squirrel which I have described above. Whether this same fly attacks our other squirrels also, or whether each kind of squirrel has a distinct species of bot-fly peculiar to it, future observers must determine. As there are two species of these insects residing under the skin of our American rabbits it is quite probable there may be more than one species producing this mutilation in our squirrels.

211. LINTNER'S BUTTERFLY, *Vanessa Lintnerii*, new species. (Lepidoptera. Nymphalidæ.)

To discover a new species of butterfly of a large size, in the State of New York, at this day, is quite an achievement, as these insects are such ornaments to collections that they have been sought after with the greatest avidity, and next to the beetles, our larger Lepidoptera have been more fully investigated and are better known than the insects of any other order. The honor of such a discovery belongs to I. A. Lintner, Esq., of Schoharie, a gentleman who takes much interest in the insects of this order, and has communicated to me several valuable facts relating to those which inhabit the section of our State where he resides.

This butterfly is closely related to the Antiopa or White-bordered butterfly, a species which is common upon both sides of the Atlantic. Its wings have perfectly the same form and are similarly colored to those of the Antiopa, but their pale border is twice as broad as in that species, occupying a third of the length of the wings, and it is wholly destitute of the row of blue spots which occur in Antiopa forward of the border. Its ground color is deep rusty brown, much more tinged with liver-reddish than in Antiopa. The fore margin of the anterior wings is black freckled with small transverse white streaks and lines, but is destitute of the two white spots which are seen in Antiopa. The broad outer border is of a tarnished pale ochre-yellow hue, speckled with black the same as in Antiopa, and becomes quite narrow at the inner angle of the hind pair. The wings beneath are similar to those of Antiopa, but are darker and without any sprinkling of ash-gray scales or any whitish crescent in the middle of the hind pair, and the border is speckled with gray and whitish in wavy transverse streaks, without forming the distinct band which is seen in Antiopa. Any further description is unnecessary. A variety of the Antiopa has sometimes been met with in Europe, in which the blue spots are wholly wanting, and individuals occur in this country in which these spots are faint and some of them obliterated. But this butterfly differs from the Antiopa so decidedly in several other characters as to forbid our regarding it as a variety of that species. Its width across the spread wings is 2.75 It was captured in a grove of willows according to Mr. Lintner's recollection.

212. IRENE BUTTERFLY, *Nathalis Irene*, new species. (Lepidoptera. Papilionidæ.)

A small yellow butterfly inhabiting Mexico closely resembles those belonging to the genus *Terias*, but differs generically in having the feelers standing apart from each other, and long and bristly, as they are in the genus *Pieris*. It forms the type of a distinct genus, named *Nathalis* by Boisduval, this species being designated *Iole*. A similar butterfly occurs in the valley of the Mississippi, which, from a specimen received from W. S. Robertson, appears to be a distinct species, differing from that of Mexico in having the under side of the fore wings destitute of a blackish central dot, and of the three blackish spots towards their inner angle the hindmost one is here prolonged into a broad stripe extending to the base of the wing and slighly separated from its inner edge; and the base of the wing instead of its outer margin is orange yellow. I therefore propose for this insect the above name. It is but an inch in width across its spread wings.

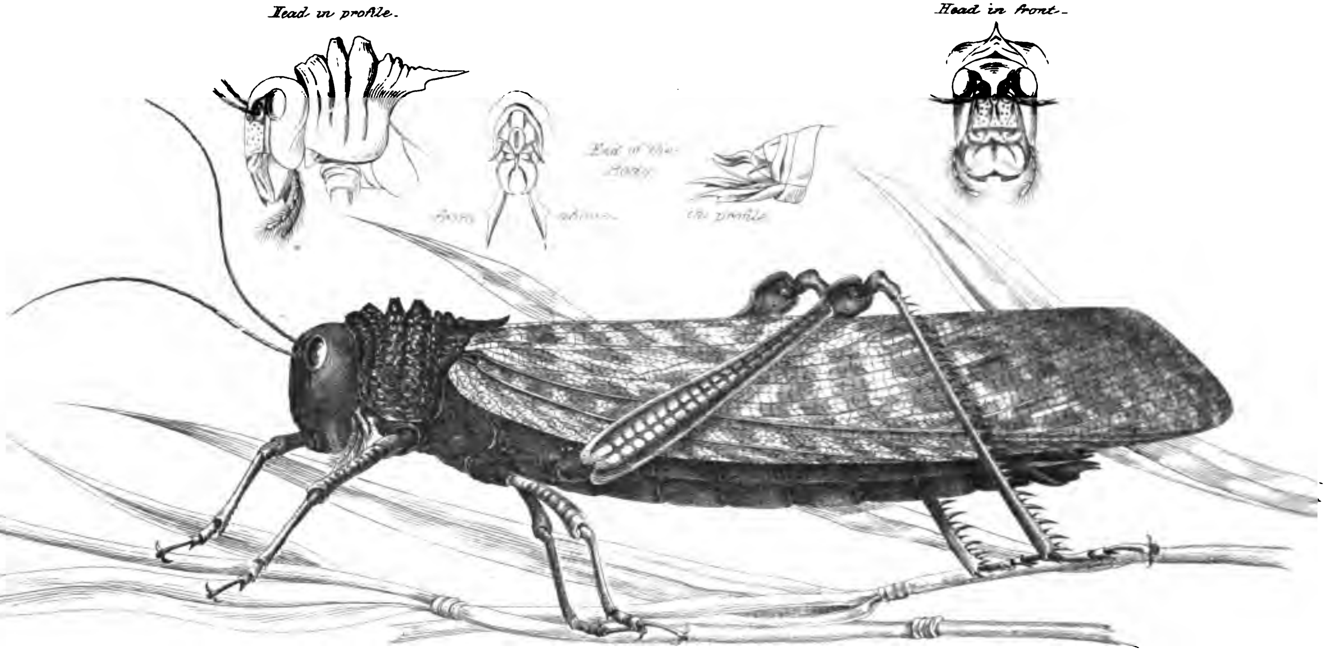
213. THREE-COLORED LITHOSIA, *Atolmis tricolor*, new species.. (Lepidoptera. Lithosiidæ.)

The Vermillion-striped Lithosia, *L. miniata*, Kirby, which is the same insect with the *Gnophria vittata*, Harris, I have met with in New-York only upon the Highlands of the Hudson. A similar moth, but much less bright in its colors, is commonly confounded with that species, from which it differs in having a large lead-colored spot on the centre of its thorax, the head and also the outer margin of the fore wings, their apical edge, their inner margin and the basal half of the stripe on their middle being nankin yellow instead of bright vermillion red, and the hind wings are lead-colored on their outer margin nearly or quite to the base. This is not rare in Washington county, and has been sent me from Schoharie by Mr. Lintner, and from Northern Pennsylvania by Dr. G. F. Horton. Its larva feeds upon the lichens or moss growing on the trunks of trees, the moth coming out in July.

214. GOLDEN LITHOSIA, *Deiopeia aurea*, new species. (Lepidoptera. Lithosiidæ.)

A truly elegant little Lithosia, sent me from Savannah, Georgia, by Mrs. Wm. G. Dickson, has the fore wings bright marigold-yellow with four bands of round pale sulphur-yellow spots upon a brilliant steel-blue ground, the hindmost band almost upon the apex, its outer half abruptly widened and slightly united with the third band, which is the broadest, and towards its outer end is abruptly narrowed and almost interrupted. Its hind wings are

PLATE 3.



Gigantic Locust of Central America

On Stone by A. Tolle.

Lith of C Van Benthuysen, Albany.

transparent, with a dusky margin and blackish veins. Its width is one inch.

215. JOHNSON'S CICINDELA, *Cicindela Johnsonii*, new species. (Coleoptera. Cicindelidæ.)

Several specimens of a beautiful Cicindela met with in the buffalo trails upon the prairies west of Arkansas were sent me several years since by W. S. Robertson. They are 0.50 to 0.58 long, bright green or blue, the wing covers broadly margined exteriorly with white, from which margin projects inwardly a medial tooth, the rounded anterior end of an apical lunule, and the nearly obsolete posterior end of a humeral lunule; mouth white; antennæ with the four basal joints green, the fifth tawny yellow and the apical joints brown; beneath bright blue clothed on each side of the breast and abdomen with dense white hairs; legs green or purple, the shanks brownish yellow. I dedicate this species to the Hon. B. P. Johnson, Secretary of the State Agricultural Society, and a prominent patron of the examination of our insects now in progress, whose assistance extended in various ways has been of much service in facilitating my researches.

NOTICE OF THE GIGANTIC LOCUSTS OF TROPICAL AMERICA.

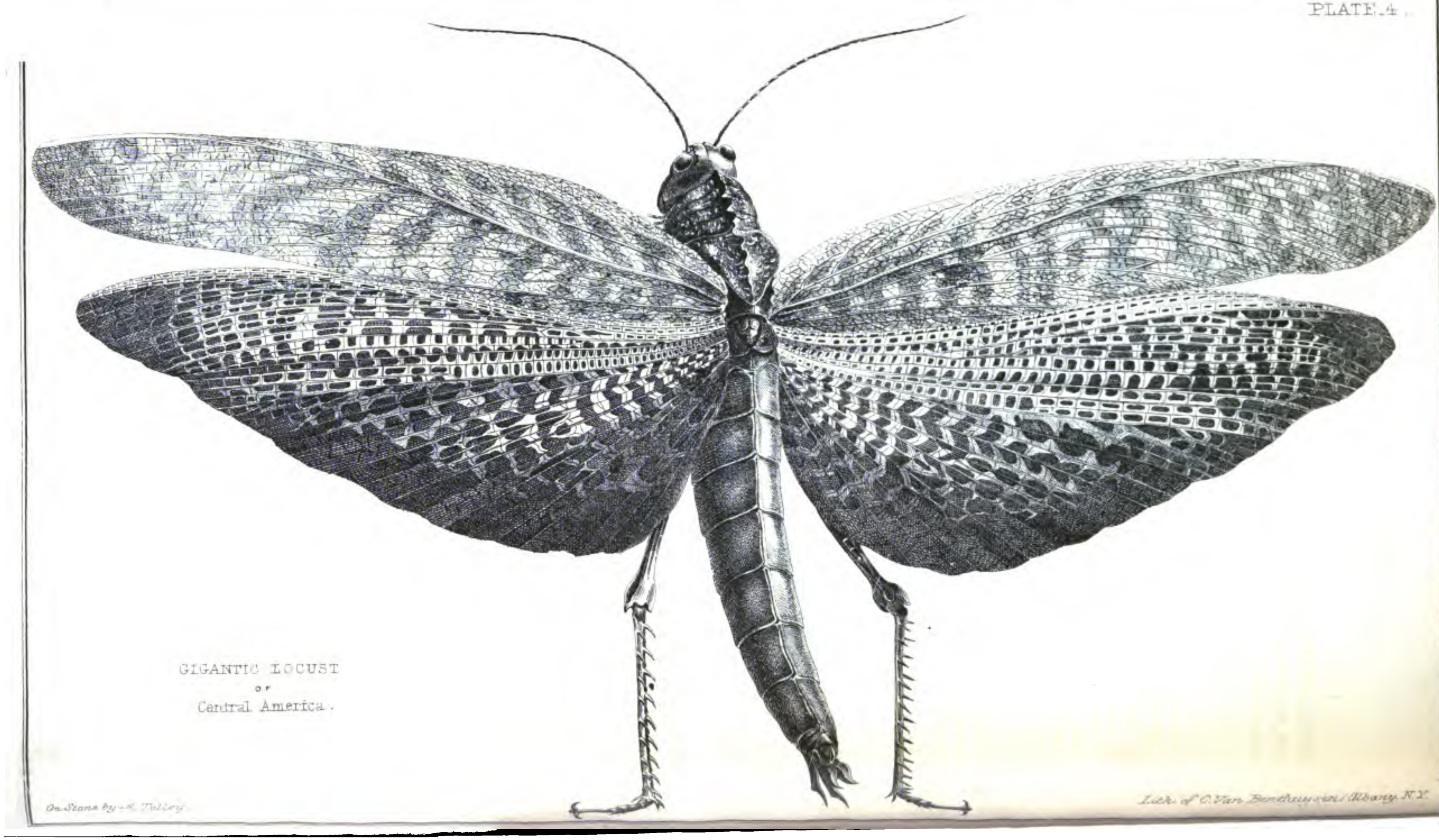
The late Lieut. CHARLES M. VAN RENSSELAER, first officer of the ill-fated steamship Central America, William N. Herndon commander, which vessel foundered at sea September, 1857, with a loss of four hundred and twenty-three lives, and bullion to the value of nearly a million and a quarter dollars, when on the trip next preceding that sad catastrophe, gathered at Panama and presented to the State Agricultural Society a number of specimens of a gigantic grasshopper or locust which he had noticed as being common at the isthmus. From the terms in which Lieut. Van Rensselaer is spoken of by those who were well acquainted with him in Albany, the place of his nativity, I doubt not it can truly be said that of the many noble, gallant spirits in the naval service of our country, not one survives, more noble, more gallant than he. Public attention was strongly directed to the devastations produced by insects of this kind, the past season, in consequence of the accounts with which our newspapers abounded, of the swarms of grasshoppers which threatened to lay waste portions of the territory of Minnesota. And it was probably these accounts which prompted Lieut. V. R. to obtain these specimens, and thus show to our citizens that other countries contain creatures of this kind which are vastly more formidable than anything with which we have to contend in our own favored land. As the insects which are thus brought to our notice are the largest of the many species belonging to a group which in all ages of the world has stood pre-eminent for its destructiveness, it is but meet that the carefully executed figures of them which are herewith presented, Plates iii and iv, should have a place in the Transactions of the Society, as a memento of the lamented donor.

When we look upon these huge creatures, the Goliaths of their race, we are led to think that the statement of Pliny is not so gross an exaggeration as has been supposed, when he speaks of grasshoppers which are three feet in length, with legs so large that the people use them for saws. And recollecting what voracious cormorants the insects of this group are, the first query which arises in the mind is, Are these insects common in the countries which they inhabit? And when we learn that they are often quite numerous we next ask, How then is it possible for anything to grow there? A dozen of these insects in one of our gardens would in a few days utterly ruin everything therein. But the same causes which in hot climates give such vigor to animal life as to produce insects of this enormous size, operate equally upon the vegetable kingdom, stimulating it to such a rapidity and exuberance of growth, such a rank luxuriance of development, as appears incredible and miraculous to those acquainted only with the vegetation of temperate and cold latitudes. Hence the havoc which these insects and hosts of others which are akin to them occasion, becomes speedily repaired.

The migratory or Asiatic locust, which, like the Asiatic cholera among diseases, stands most prominent for the sudden and sweeping destruction which it occasions, is one of the largest insects of this kind which inhabit the eastern continent, measuring two inches in length. But in the tropical countries of America four different insects of the same group are met with which are nearly or quite double the size of that noted species. And we are informed that like it, these insects are migratory, uniting together in swarms at times when they are numerous, taking wing, and causing the most frightful devastation in the districts where they alight, often consuming every green thing and leaving the spot as naked and black as though fire had passed over it. Hence the name locust is supposed to have come from the Latin words *locus ustus*, signifying a burnt place.

Whilst the U. S. ship Portsmouth was lying in the harbor of Acapulco, Mexico, in the summer of 1854, Lieut. Thomas Pattison informs me that persons visiting the vessel frequently gave accounts of the terrible havoc which was then going on a few miles back from the coast, from swarms of large grasshoppers which had alighted there; and some of the officers on their return from an excursion on shore, among other things related that they had seen the limbs of trees which were thicker than a man's arm, broken down by the numbers of these insects which had alighted upon them to feed upon the leaves. A large grasshopper which Lieut. P. found upon the coast and which he thought might perhaps be a straggler from these swarms, probably was not the species concerned in this ruin, as it pertains to the group called caty-dids or green grasshoppers (Family *Gryllidæ*) and not to the family of locusts (*Locustidæ*). These two families are readily distinguished from each other by their antennæ, which are short and of equal thickness, like a thread, in the latter, and in the former long, slender and perceptibly tapering towards their

PLATE. 4.



GIGANTIC LOCUST
of
Central America.

On Stone by A. Tilley

Lith. of C. Van Benthuysen, Albany, N.Y.

tips. As the insect presented me by Lieut. P. is remarkable for the length of its antennæ, which surpass those of any species which I find described by authors, I here give a short account of it.

The LONG-HORNED CATY-DID, *Acanthodis macrocerus*, has antennæ four times the length of its body and measuring eight inches or more in length. It is five inches in width and two in length, and is of a pale dull yellow color The head is smooth and shining, with a projecting tubercle between th antennæ, which is hollowed on its upper side like the concavity of the bowl of a spoon, and from this hollow a wavy impressed line extends back to the base of the head. An elevated ridge margining the sockets of the antennæ has an impressed furrow on its outer side, in which on the under side are two black dots. The antennæ are tawny yellow, towards their tips black, their basal joint thick, cylindric, pale greenish yellow, with an oblique brown stripe on its under side. The thorax is rough from irregular elevated warts and ridges, and is crossed by two transverse grooves, in which and in the other indentations are several black dots and irregular spots. The wing covers are pale olive green, 2.40 long and 0.60 broad, widest in the middle and rounded at their tips, with a clear glassy spot on the inner base of each. The wings are smoky blackish with pale dull yellow veins and black veinlets and a very narrow pale hind border, and four rows of cells upon their outer margin are colorless and transparent but not clear and glassy. The four forward thighs have three rows of small brown spots towards their tips, the row upon their fore sides being longest, and on their under sides is a row of five small spines. The shanks have two rows of similar spines, of which there are about ten in the forward row and eight in the hind one. The hind thighs have a row of ten spines on their under side, and their shanks have on their outer sides two rows of spines, about fourteen in the inner and one less in the outer row, and on their inner sides two rows, the outer with thirteen and the inner with ten spines, all these spines being tipped with black. The individual is a male and was preserved in diluted alcohol.

The gigantic locusts of tropical America, of which as already stated there are four distinct species, are so similar to each other in size and in several of their most prominent and peculiar marks, that three of them were for a long time confounded together and were supposed to be but one or two species. Now that we come to possess a number of specimens taken together at one locality and see how alike these all are in their colors and other characters, it is evident that these insects are not subject to any material variations, and that the species into which they have been separated are well founded and are clearly distinct. They all pertain to the genus to which authors generally have given the name *Acrydium*, this genus differing from that to which the Migratory locust and most of our common grasshoppers in this country pertain, and to which the name *Locusta* most appropriately belongs, in having a spine or teat-like process hanging downwards in the middle of the breast between the haunches of the anterior pair of legs. These large species form a distinct group or section of that genus, differing from all the other species in having the thorax rough, with its anterior part elevated in the middle into a sharp-edged keel or crest which is cut across by three deep transverse furrows, dividing this crest into four lobes, as will be seen by a reference to the figures herewith presented, and the anterior end of this crest jutting forward in a point which projects over the base of the head. Their hind thighs also have two rows of white spots on their outer face, those of the upper row being commonly round and the others broad oval. In addition to this, three of these species further agree in having the wings spotted with black in a peculiar manner, as shown in the figure on plate iii, these spots having some resemblance to waves running from the body outwards and becoming more dense till they pass into a border which is totally black, upon the hind margin of the wings. The wing covers of these species also show faint spots forming obscure transverse bands. Agreeing with each other in these several marks, it is not surprising that these insects should have been regarded as forming but one or two species, the differences between them being imputed to a fading of particular specimens. The four species can be most readily distinguished from each other by the ground color of their wings. Their names and the colors alluded to are as follows :

The CRESTED LOCUST, *Acrydium cristatum*, Linn. Greenish blue.

The LEADER LOCUST, *A. Dux*, Drury. Brick red.

LATREILLE'S LOCUST, *A. Latreillei*, Perty. Pale yellow.

The HALF-RED LOCUST, *A. semirubrum*, Serville. Vermillion red, the outer half pale green.

The females are usually three and a half inches long in each of these species except the third, in which they measure from four to nearly four and a half inches. Their males are remarkably smaller, being but about half the size of the females. The Crested locust is the most common of all these gigantic locusts, occurring in abundance along the river Amazon and other parts of Brazil and in Cayenne. This has also received the name of White-legged locust (*albipes*) from Degeer. Authors usually state this species to be four inches in length, but my specimens received from M. Lacerda and others, each measure as above stated. All the insects of this family, however, vary in their size. The Leader locust inhabits the same countries with the Crested locust, and according to Drury it occurs at Honduras also. Indeed it is probable that each of these insects will be found in all the countries between the tropics. Latreille's locust has heretofore been known as occurring only along the Amazon and in other parts of Brazil, but the specimens gathered by Lieut. Van Rensselaer show that it is common at Panama also. Its width across the extended wings is from eight to nine and a half inches, its thorax being 0.60 wide and 0.80 high. Its four anterior legs are an inch and a half long and the hind pair 3.65 to 4.10, its antennæ 1.60. The specimens were preserved in diluted alcohol, and are of a pale dull yellow color. The figures herewit presented show the form of the several parts so distinctly that a detaile description is scarcely necessary. According to Stoll's figures the male is bu two and a half inches long with the colors brighter, and the wings of a rose-red tint bordered and spotted with black the same as the female. The Half-red locust has as yet been captured only in Cayenne. It differs from the other three species in having the wings destitute of a black border and spots. It was first made known by Stoll, under the name of the Yellow-horned locust (*flavicorne*), and this author appears to have regarded it as identical with a Chinese species, the Rose winged locust (*A. roseum*) of Degeer, subsequently named *flavicorne* in the works of Fabricius, Donovan, Serville and others. Hence Serville changed the name to that which it now bears.

FOURTH REPORT

ON THE

NOXIOUS AND OTHER INSECTS

OF THE

STATE OF NEW-YORK.

By ASA FITCH, M. D.,

ENTOMOLOGIST OF THE NEW-YORK STATE AGRICULTURAL SOCIETY.

Copy-right secured to the Author.

Executive Committee of the New-York State Agricultural Society:

The interval between the issuing of the volume of the Transactions for 1856 and the going to press of the volume for 1857 is so brief, that it does not enable me to furnish so full a Report on this as on previous occasions, or to give to all of the topics of the present Report so careful an examination as I desire. In my last Report an account was given of all the American insects at present known as being injurious to Fruit trees, both cultivated and wild, embracing a brief history and description of each species, and a detailed statement of any facts known to me in addition to what had previously been recorded, which would aid in rendering our knowledge of any of these species more complete. Next in order comes the insects injurious to Forest trees, and these I had expected to complete in the present Report; but in consequence of the shortness of the time at my disposal, I am able to finish only a portion of this subject. The present Report is therefore limited to those species which infest the pine and other evergreen trees. All those insects of our country which are at present known as depredators upon the trees of this order, will be found noticed in the following pages. But as these insects have been much less investigated than those which infest fruit trees, it is impossible in many instances to give an explicit statement of their habits and the appearance of their larvæ. To facilitate references from one species to another, the numbering of them is continued onward from the last Report in one continuous series.

The evergreens are so highly esteemed for ornamental purposes, and some of them, particularly the pines, are so valuable on account of the timber they yield us, that we are much interested in knowing the insects which we have in our country, which infest these trees to their injury, either by stinting their growth, marring and deforming them, or causing their premature decay and death. Fortunately for us, it is upon trees that are sickly and decaying or upon their dead trunks and timber that most of these insects make their attack. Such insects are currently regarded as being of but little importance, those only which are the source of the evil, which prey upon trees that are healthy and in full vigor, causing them to become sickly and decrepit, being deemed of a character so pernicious as to merit special observation. And yet those insects which only invade dead trees and their timber are at times occasioning serious losses, showing they are very far from being such trivial evils as we are accustomed to deem them. Whilst this Report is in the course of preparation a casuality occurs in our midst which furnishes a forcible illustration of the truth of this statement. I allude to the breaking of the railroad bridge over the Sauquoit creek near Utica, on the morning of May 11th, by which frightful disaster eight persons lost their lives and upwards of fifty others were maimed and injured more or less severely. We are informed by the Utica Morning Herald, in an article prepared immediately after the writer had visited and examined the scene of this catastrophe, that the principal timbers of this bridge, though externally perfectly sound in their appearance, were profusely perforated with minute worm holes, whilst all the interior was so decayed and rotten that the slightest force sufficed to break it into fragments. This fully explains to us why a structure which had been so recently erected that no suspicions could reasonably be entertained of its being in the least defective and unsafe, was yet in reality fearfully so. Some one of those minute timber-beetles which subsist upon the wood of dead trees had here had ~~its~~ their abode, multitudes of them probably mining their burrows everywhere through the interior, as is their habit, and then eating their way out and departing to found new colonies elsewhere. As the little pin-holes which they perforate scarcely diminish the strength of the timber in the least, they are deemed of no consequence. And yet from every shower that passes, water is admitted through these perforations to the interior of the timber, filling the multitude of little cells which these insects have there excavated and saturating the wood as though it were a sponge. The outer surface being exposed to the atmosphere speedily dries and thus remains perfectly sound, whilst the interior continuing damp for several days, rapidly though insidiously decays. Thus the sad disaster to which we have alluded, and the destruction of property and loss of life with which it was attended, there can scarcely be a doubt, was caused by one of those minute insects which are popularly regarded as being of trifling consequence, since they never attack healthy living trees.

Thus, in addition to those insects which prey upon it when alive and growing, every kind of wood appears to have one or more of these small creatures peculiar to it, which make their attack after it is dead, rapidly accelerating its decay. Instances of timber, furniture and utensils ruined by insects of this kind, are frequently presenting themselves to our notice. Wood thus perforated externally with pin-holes and having its interior everywhere mined with the tracks of these small beetles and their larvæ, with its substance more or less reduced hereby to a fine dry powder, is currently termed "powder posted" in our community; and in books this same affection is sometimes referred to as constituting one of the kinds of "dry rot."

On bringing together, as I am endeavoring to do, all the insects of our country which are at present known to be injurious, it forms a list of depredators upon some of our trees that appears truly formidable. And yet, no one must deem that what is now presented in these Reports, embraces all the insects, or even all the important ones that occur upon the several kinds of vegetation under which they are arranged. Our knowledge of this branch of our Natural History is still limited and imperfect. How many of these pests are still lurking unobserved and unknown to us, we know not, but that the number is considerable there is no doubt. Correspondents are frequently addressing me with inquiries respecting species of which they are unable to find any account, as yet, in these Reports; and when such communications are accompanied with specimens which I am able to identify, I not unfrequently find the insect to be one which, if known at all, has not hitherto been known as inimical. Though but part of a year has elapsed since my last Report was completed, more than one species in addition to those therein noticed, occasioning serious losses to nurserymen and fruit growers in some sections of our country, has already come to my knowledge. And such numbers of these depredators still remain undiscovered, that the day must be regarded as yet distant before our acquaintance with this subject can approximate completion.

Respectfully submitted,

ASA FITCH.

July 21, 1858.

INSECTS INFESTING EVERGREEN FOREST TREES.

The pines, firs and other evergreen trees forming the natural order *Coniferæ*, constitute a very distinct group among the forest trees of every country, differing remarkably by the sap or turpentine which forms their circulating fluid, a substance very unlike the mild watery juices of other trees. This substance is so repulsive and even poisonous to insects generally, that its essential oil has been much employed to protect the specimens in cabinets, drawers of clothing, &c., from the invasion of moths and other vermin of this class. Hence the trees of this kind are among the most cleanly that we possess, being seldom disfigured and stripped of their foliage by caterpillars and worms. This exemption is one prominent cause of their being so highly valued for ornamental purposes. And yet, as the following pages will show, these trees, particularly the pines, have a formidable number of insect enemies. But fortunately it is the bark and wood of decaying and dead trees which most of them prefer. In the introduction to a most valuable series of articles upon the insects of the maritime pine of southern Europe, now in the course of publication in the Annals of the Entomological Society of France, the author, M. Edouard Perris, gives a list of more than a hundred species which he has met with infesting this one kind of tree. He finds that every part of the tree has its enemies among this class of creatures. The flowers, the seed-cones, the leaves, the twigs, the bark, the wood, all have their peculiar insects, which they serve, some for food, others as a cradle for the repose of their offspring. Of these insects one portion infest the tree only when it is young, and a different sett resort to it when it is old. Some make their attack when the tree is in full health and vigor, others invade it only when it is sickly and feeble, and others still are attracted to it after it is dead and decaying, whilst yet a number more infest the dry timber and furniture made from its wood. Most of these depredators moreover have carnivorous and parasitic insect destroyers which subsist upon them in various ways. And in addition to all these, there are still other insects which live upon the fungous plants growing upon this tree. Thus, as M. Perris well observes, this one tree is necessary for the existence of a vast concourse of animals of this class, and were it destroyed it would cause the immediate ruin of such a multitude of species and such a throng of individuals, that we may well ask if the consequences of such an event, apparently of little importance, would not in reality result in great physical disorder—if the rupture of this single link would not produce a commotion in the whole length of the chain and convulse the laws which regulate the natural world.

On perusing the list of M. Perris above mentioned, and the works of other foreign authors who treat upon the same subject, every one will be struck with the close correspondence between the insects infesting the pines in Europe and in this country. Each European species appears to have a representative upon this side of the Atlantic, closely related to it and depredating upon the tree in the same manner, and accompanied also and preyed upon by insect destroyers which are equally similar. Only one prominent exception do we observe, to what has now been stated. We have in this country no insect occupying the place of the Pine processionary moth (*Thaumatopoea Pityocampa,*) the most formidable enemy to the leaves of the pine of any insect known to us, the caterpillar of which makes its appearance in July and August, in numerous companies, each company forming a cobweb-like nest, like that of our common apple-tree caterpillars, this nest being usually placed on the tip of a limb, the worm reposing in it through the winter and continuing its devastations the following spring, often killing the limb on which it resides. The only worm which we have in the State of New-York, which lives in societies upon the pine, stripping particular limbs of their leaves; is a species of saw-fly, (see No. 273,) analagous to the pine saw-fly (*Lophyrus Pini*) of Europe.

Our knowledge of the insects which prey upon the pines and other evergreen trees in this country, is at this day quite limited and imperfect, extending chiefly to the larger species only; and of most of these very little is known, beyond the general fact that they reside upon these trees, and pertain to groups that are injurious to vegetation, all the details of their particular habits and economy remaining to be investigated. And a multitude of small insects, species of moths, midges, etc., which, from their occurrence upon these trees in Europe, there can be little doubt exist here also, remain yet to be discovered. Were one or two seasons specially devoted to ascertaining the insects which depredate upon the pine, the number of species which we are at present able to present would be greatly augmented. And to attain a knowledge of the particular habits of each one of these depredators, and the diversified structure of the galleries which very many of them mine beneath the bark and in the wood, will require the assiduous observations of many years.

The pines, spruces, firs and cedars are so closely related to each other that we should expect a portion of the insects which live upon one of these trees would be able to subsist upon some or all of the others also. But as the evergreens differ so widely from all our other forest trees, and as their terebinthine sap is so repulsive to insects generally, it would be deemed quite improbable that any insect which lives upon these trees will be able to sustain itself upon trees which do not pertain to this group. It is a remarkable fact, therefore, that among the insects noticed in the following pages, instances occur of species which are not confined to this class of trees, but feed and thrive equally well upon particular trees of the deciduous class also. A notable example of this we have in the large caterpillar of the Pine emperor moth, (*Ceratocampa imperialis*) which inhabits the sycamore as well as the pine, than which two trees can scarcely be found whose characters and properties throughout appear more dissimilar.

1. THE PINE.—*Pinus strobus*, *rigida*, *etc.*

AFFECTING THE ROOT.

The AMERICAN WHITE ANT, *Termes frontalis* of Haldeman, already described (No. 196) as being often destructive to chestnut posts and rails, mines its burrows in the white pine (*P. strobus*) more than in any other tree, the softness of the wood probably rendering it favorite food for this insect. When pines of the "second growth," which are so much softer than the original or first growth of these trees, are cut down, their roots, and also their trunks, when lying upon the surface of the ground, immediately become the abode of colonies of these insects, which rapidly multiply into countless myriads, whose operations are continued until the stumps are reduced to mere shells.

Since my previous notice of this insect, I have observed that it sometimes lives in society with, and is nursed and protected by the common black and red ant (*Formica rufa*). Early in April, on opening a hillock of the red ant, white ants were found therein in much greater numbers than the builders and true owners of the hillock. In addition to the workers, numerous soldiers, and pupæ with four rudimentary wings nearly half the length of the abdomen, were found at that early date; and although they were quite active in secreting themselves by running into the deeper cells of the hillock, the more brisk and stout red ants eagerly aided them in withdrawing, grasping them in their jaws and carrying them off under ground, making no discrimination between these white ants and the eggs and young of their own kind in this operation. And it was curious to notice that, though a white ant were running to hide itself as rapidly as its six legs could carry it, when met and grasped by a red ant, it instantly became perfectly passive and motionless, allowing its more athletic friend to tug and toil in dragging it away, without stirring to assist in the labor, evidently feeling that it was much more safe and sure of protection when in charge of the red ant, than when left to its own resources.

216. Bristly-necked Valgus, *Valgus seticollis*, Beauvois. (Coleoptera. Melolonthidæ.)

Beneath the bark around the crown of the roots of ant-eaten stumps, feeding upon the wood, fleshy, white, thick cylindrical grubs, resembling small larvæ of the May beetle (No. 76), having three pairs of legs anteriorly and the body curved into an arch, its hind part being bent more or less inward under the breast, divided by impressed transverse sutures into twelve rings; the pupæ and perfect insects also occurring in the same situations; the latter short thick beetles about 0.28 long, the males chestnut brown, beneath black, the females dull black, both sexes with chestnut colored feet, and covered more or less with little ash gray scales, flattened upon their backs, their wing covers much shorter than the abdomen and marked with rather obscure impressed lines, a broad shallow groove along the middle of their thorax, which groove is more deep anteriorly, and their anterior shanks with a row of about five little uneven teeth along their outer edge.

In the month of April last, I met with sixteen of these beetles beneath the bark of a pine stump, slightly above the surface of the ground. The stump had been much eaten, by white ants apparently, the sap wood being all consumed and the cavity thus formed being stuffed with sand and dirt which had been carried up from the soil beneath, in which these insects were lying, torpid in their winter quarters, most of them crowded together in a heap in a single cavity in this dirt, the others scattered about in it singly, their larvæ having no doubt sub sisted upon the decaying wood.

This is the insect which is named *Trichius dispar* in Dr. Harris' Catalogue. It however had been long before described by Beauvois under the name *Trichius seticollis*. The genus *Valgus*, in which it is included by entomologists at the present day, is distinguished from *Trichius* by its hind pair of legs arising wide apart from each other, and its forward shanks having usually five teeth instead of but two or three.

The sexes of this insect differing so much in their colors, has caused great perplexity to authors and has led to much confusion in the few notices of it which have been published. Thus

Beauvois described the male as a distinct species under the name *squamiger*; and Burmeister has given the male of our other American species (the Channel-necked, *Valgus canaliculatus*, Fab.) as being the male of *squamiger*, and the male of this species as its female, retaining the female of this as the true *seticollis*. This will serve to show the reader some of the embarrassments which are frequently besetting ones' path in investigating this branch of nature's works. At length M. Zimmerman having met with two of these beetles paired, M. Schaum was enabled from these specimens to see this subject in its true light and disentangle it from the confusion in which it was involved. And now having myself found such a number of these beetles of both sexes, under circumstances which indicated them all to be the progeny of one parent, I am able to confirm the statements of M. Schaum.

In addition to their color, M. Schaum states that the females differ from the males in being more long and thick; but I am unable to discern any difference between the sexes in respect to their size. Several other characters, however, may be noticed, which serve to distinguish the sexes. In the male, when viewed laterally, the last segment of the abdomen declines much more nearly in a perpendicular direction than it does in the female. The inferior or hind edge of this segment has a slight concavity in its middle in the latter which does not occur in the former. Beneath, also, the penultimate segment of the abdomen in the male is scarcely double the length of that which precedes it, whilst in the other sex it is plainly much more than double the length of the same segment. The last segment also is longer in the female than in the male. In addition to this the second and sometimes the third segment commonly shows an impressed line lengthwise on its middle in the male, whilst in the female no traces of such a line occur. The teeth of the forward shanks are longer and stouter in the female than in the male. Of these teeth the middle one is the most prominent, and there is a wider interval between it and the next one forward of it than between the others.

In connection with this, I may notice the following species which appears to be undescribed.

PINE. ROOT.

217. Saw-necked Valgus, *Valgus serricollis*, new species.

Differing from our two other species in being smaller sized, the thorax having along each side a regular series of small sharp-pointed teeth as broad as long, resembling those of a saw, the middle of the abdomen beneath densely coated with scales of a bright orange yellow, and the anterior shanks with but two or three short teeth as broad as long. Length 0.17.

Of this species I have seen but one specimen and the abdomen of another, which were received from the vicinity of Jackson, Mississippi. They are males, of a chestnut red color, the hind breast and abdomen beneath black, its last segment chestnut. A large blackish cloud also occupies the middle of the closed wing-covers. The thorax is grooved, the wing-covers are striated, and the surface is sprinkled with scales, similarly to the other species. On the under side the scales are rather sparse and of the usual gray color, but on the middle of the abdomen they become dense, wholly hiding the surface, and are here bright orange. The anterior shanks have a tooth at their tip, and another near their middle, and a very slight angular projection of the surface near their base.

AFFECTING THE TRUNK.

218. Virginia Buprestis *Chalcophora Virginiensis*, Drury. (Coleoptera, Buprestidæ.)

Occurring upon the leaves of the pine in autumn and spring, a hard oblong elliptic beetle, always an inch or more in length, of a burnished brassy or coppery color, and rough from confluent confused punctures, with elevated polished coarse black lines, of which there are three on the thorax, the outer ones obscured with coarse punctures, and four on each wing cover, all of nearly equal width and curved anteriorly, the second one from the suture almost totally interrupted by two impressed spots crossing it, and the third obliterated posteriorly and uniting anteriorly with the fourth. Its larva boring in the sap wood.

Quite a number of the insects of the family Buprestidæ, in our own as in foreign lands, live at the expense of the pine, fir and other evergreen trees; and M. Perris remarks that of all the insect enemies of the pine, some of these beetles are the most pernicious, since they make their attack upon living trees that are in perfect health, causing them to become sickly and to perish, whereas most of the other insects which infest this tree prefer it when it is decrepit and diseased, or after it is dead.

It is in their larva or growing state that these insects injure the trees, some of them boring in the interior of the sap wood, but most of them excavating their burrows in its outer layers immediately beneath the bark, girdling the tree more or less by their operations. Of the habits of the several American species which we know are bred in the pine from uniformly finding the beetles upon this tree, our knowledge is at present very limited. Hence we can give the reader but little information respecting them, except as they appear in their perfect state. The larvæ, however, all bear a close resemblance to each other, and are so very different from the larvæ of all other insects, that they can be recognized at a glance. They are destitute of feet, and their shape has been compared by different writers to that of a tadpole, a battledoor, a pestle with its head flattened, a flattened matrass bottle, that is a round-bellied bottle with a long slender neck; and these comparisons will give the reader a sufficiently exact idea of their appearance, to enable him to distinguish a larva of this kind whenever it occurs to his notice. And on a particular inspection it will be seen that its anterior end is very broad, round, and strongly flattened, as though it had been pressed and distorted by some casuality, the upper and under surface of this flattened portion being covered with a harder callous-like plate which is differently sculptured in different species, and is marked on the upper side with two straight impressed lines, approaching each other anteriorly like an inverted letter V, and on the under side similarly marked, or with only a single impressed line along the middle. This dilated portion forms the first segment of the thorax, and has the head sunk into its anterior end, with its black sharp-pointed mandibles or jaws projecting in front, like the blades of nippers. Sometimes, as in the Thick-legged Buprestis, figured in my First Report, page 27 (Transactions, vol. xiv., p. 731,) an impressed line, resembling a suture, crosses the fore part of this dilated segment, seemingly dividing it and forming a short segment between it and the head. Two short segments succeed to this dilated one, the suture between which is sometimes so slight that they appear like one segment only. These short segments are followed by longer, narrower ones, ten in number, of nearly equal size, and only about half as broad as the anterior portion, to which they appear to form a cylindrical or slightly tapering tail-like appendage, the terminal segment being narrower than the others and rounded at its tip. Thus, including the head, these larvæ are composed of fourteen segments, which is one more than is found in the larvæ of any other insect of this order, except the long-horned beetles.

The burrows which they excavate are also so peculiar that on raising the bark they are at once distinguished from those of the several other larvæ which reside in the same situation. They are long, narrow and very shallow grooves in the surface of the wood, forming irregular wavy or serpentine tracks which gradually increase in width as the worm has increased in size, and are stuffed with its chips and castings firmly packed together. At the larger end of the burrow an oval hole is usually seen, running down into the wood, into which the larva has retired to repose during its pupa state. These burrows, however, as well as the larvæ which excavate them, are subject to considerable variety in the different genera and species of these insects. Some of them mine their galleries in the interior of the sap wood at the depth of a half inch or more beneath its surface, and in a longitudinal direction, the larger end of the perforation turning outward to the bark to enable the insect to make its exit when it attains its perfect form. Ratzeberg thinks the larvæ are two years in obtaining their growth, but Perris is confident they come to maturity in one year when no unfavorable circumstances retard them.

The pupæ are very different from the larvæ, and resemble the perfect insects in their form, but are soft and white, with their rudimentary legs and wing covers appearing upon their exterior surface, enclosed in sheaths like the hand in a glove, the same as in the pupæ of most other insects.

The perfect insects are often adorned with brilliant green, coppery, golden or other metallic colors, rendering them the most splendid subjects of the order to which they pertain. They are mostly about three times as long as wide, and of an elliptic form, more rounded in front and tapering behind, flattened and rather more convex beneath than above, their bodies covered with a very hard shell and quite compact, the head being sunk into the thorax to the eyes, and the thorax closely fitted to the base of the wing-covers. Their feet are five-jointed, their legs rather short, and their antennæ small and thread-like with each joint projecting in an angle along one side, whereby they resemble a saw. A point projects backward from the middle of their breast and is received into a notch in the hind breast, but this point is not compressed and sharp so as to slip into the notch with that powerful spring which it possesses in the snapping beetles (ELATERIDÆ,) and hence these beetles when laid upon their backs are unable to throw themselves upward to regain their normal position.

The short statement which has now been given of the general characters of these insects will suffice to distinguish them, and render a repetition of the same characters unnecessary under each of the several species which we have to notice.

A variety (*immaculata*) of the Virginia Buprestis may sometimes be met with, in which the impressed spots upon the wing covers are scarcely perceptible, the second raised line continuing of nearly its full size across the position which these spots occupy.

219. LIBERATED BUPRESTIS, *Chalcophora liberta*, Germar.

[Plate iii, fig. 5.]

Very similar to the Virginia Buprestis, but always smaller sized, measuring from 0.75 to 0.90 in length, with the second raised line of the wing covers broader than the first or inner line, and totally obliterated where it is crossed by the posterior impressed spot, its middle portion between the two impressed spots usually showing a few scattered punctures.

This species is much more common in Eastern New-York than the Virginia Buprestis, the beetle appearing upon the leaves of pines throughout the summer and autumn. From a small grove of young pines only a few rods in extent, upwards of a hundred specimens were taken, the middle of last September, one or two being found upon almost every tree and bush; whilst only four individuals of the preceding and two of the following species were found in company with them. They had probably been bred in the numerous stumps of larger trees which had been cut down the year before by the side of this grove. They stationed themselves at the tips of the limbs, clinging to the leaves with their feet, with their heads inwards, their position, shape and size giving them a close resemblance to the young aments or fruit cones which were growing from the same points on several of the limbs; and they appeared to be eating the young buds, which are probably the food on which all these beetles subsist after arriving to their perfect state.

Other marks which characterise this insect may be gathered from the description which we present of the following species and the comparison between the two which is there instituted. The rough intervals between the elevated smooth black lines in this species are usually of a brilliant brassy yellow color, but varieties occur in which they are coppery red, black, brassy gray, or beautiful brassy green. In one specimen before me the two middle raised lines of the wing covers are confluent, separated only by punctures but with no depression between them.

220. New-York Buprestis, ***Chalcophora Novæboracensis***, new species.

A beetle closely related to the preceding, but slightly larger, the males measuring 0.90 and the females one inch in length, with the raised lines of the wing covers much more broken and irregular, the third line small and commonly wholly obliterated except an elevated smooth spot on the outer side of the posterior impressed spot, which smooth spot is confluent with the outer raised line, this line being more slender than either of the other raised lines and much more slender than the corresponding line in the foregoing species.

Only five individuals of this species have fallen under my notice, two of them males. Though closely resembling the insect last described it is undoubtedly distinct; and a comparison of these two species will give the reader a more distinct view of each than to describe them separately.

In both these insects the front has an impressed line along its middle, but here this impression is more widened and is crossed on the middle of the face by a transverse indentation of the shape of a crescent with its convex side upward. The smooth elevated lines on each side of this middle line, which are more or less distinct in the foregoing species are not obvious here. The elevated smooth line on the middle of the thorax is much more narrow here and often becomes narrower posteriorly, sometimes wholly vanishing before it reaches the base, whilst in the preceding it tends to widen posteriorly. The elevated smooth irregular stripe on each side of the middle, in which are a few punctures, and which is forked as it were at its forward end, with the outer branch of the fork more broad, is here continued to the base of the thorax, whilst there it terminates, wholly or partially, before it reaches the base. The elevated smooth pyramidal spot on the base outside of this and opposite with a wide shallow groove along the middle, which is sometimes very slight, the surface covered with coarse punctures which become dense and confluent along the sides, as they are upon the head also, which has a slender elevated line along its middle; the under side brilliant coppery.

Like many other insects of this family, the Golden Buprestis is subject to some variations in its colors, which have led authors into the error of regarding it as forming two additional species, namely,

The Striated Buprestis (*B. striata*, Fabricius). The blue-green stripe on the wing covers wanting, their whole surface being coppery red. The name has allusion to the elevated lines on the wing covers.

The Intricate Buprestis (*B. impedita*, Say). The coppery red color of the head, thorax and under side tinged more or less with green. The name was suggested by the close resemblance of this to the preceding and to some other species described by authors.

Like most of the other insect borers in the pine, it appears to be the dead wood of logs and stumps which this species prefers, to living trees. T. B. Ashton informs me he once found the fragments of one of these beetles in the interior of a pine log. I have met with it in two instances, stationed at the tips of the limbs of young spruce trees in my yard, and it is probable that in its perfect state it feeds upon the tender young buds of the pine and the spruce. It will be liable to attract the notice and admiration of every one, wherever it presents itself, its sparkling lustre and the fine bright colors with which it is adorned, rendering it one of the most beautiful insects of our country.

224. ULTRAMARINE BUPRESTIS, *Buprestis ultramarina*, Say.

This truly elegant species, which closely resembles the preceding in size and colors I notice in connection with it, it having been but partially described by Mr. Say, from a specimen in which the head and thorax were wanting. I however know nothing of its habits, except that the beetle was met with the middle of July in a forest of pines and other trees. Its close relationship with the foregoing species indicates that it will probably be a depredator upon the same kinds of vegetation with that.

The Ultramarine Buprestis is half an inch long and of a brilliant green color tinged with golden yellow, the sides of the thorax being pure golden and also a stripe along the middle where is a very slight wide groove, scarcely obvious. The wing covers are brilliant blue, which color is margined on each side and at the base with golden yellow tinged with green, the suture and outer margin being burnished coppery red. On each wing cover are about eight rows of large deep punctures placed closely together, and some of them united or confluent, and between each of these rows is a series of smaller round punctures. Their tips are cut off transversely and on the side next to the suture is a minute projecting tooth. The scutel is circular, deeply concave, and green with its sides blue. The thorax is covered with close, deep, coarse punctures, which are more dense and confluent on each side. The head is rough from similar confluent punctures, with a slender, smooth elevated line in its middle. The antennæ are black with the basal joints coppery red. The under side is burnished coppery with the sutures of the abdomen green.

225. SPOTTED-WINGED BUPRESTIS, *Buprestis maculipennis*, Gory.

A shining brassy-black beetle, sometimes blue-black or dark bottle-geeen, of the same shape with the preceding and 0.45 to 0.65 long, each wing cover with from three to six pale tawny yellow spots of irregular shape and very variable, the mouth and throat often and sometimes the face of the same color, and also a spot on each side of the last segment of the abdomen beneath, the wing covers with several impressed lines and a row of punctures on each of the interstices between them, the thorax with coarser close punctures and a single large one on the middle of its hind edge.

I have met with this in July, on pines growing at a distance from any other trees, an evidence that it had been bred from them. The spots on its wing covers are extremely variable, being alike in no two specimens; and it is quite probable, as our American entomologists have supposed, that this is only a variety of the following.

226. ORANGE-LINED BUPRESTIS, *Buprestis lineata*, Fabricius.

Very like the preceding species, but slightly larger, measuring 0.60 to 0.75 in length, and the wing covers with two tawny orange stripes on each, the inner one of which is widest at its base and does not reach to the tip. Here also the last segment of the abdomen, beneath, has a tawny orange spot on each side, and the throat, mouth and face and a stripe on each side of the thorax are yellow, varied in places with red.

227. YELLOW-DOTTED BUPRESTIS, *Trachypteris fulvoguttata*, Harris. (Coleoptera. Buprestidæ.)

Appearing upon pines in June, a more flattened beetle than the foregoing, 0.30 to 0.43 long, of a brassy black color with three pale yellow dots on each wing cover placed towards the hind part and equidistant from each other, the hindmost ones nearest to the suture and the middle ones farthest from it; the fore ends of the wing covers moderately rounded and fitting into corresponding concavities in the base of the thorax; the whole surface covered with shallow rough punctures running together transversely and somewhat resembling the grained side of morocco leather, and the thorax having an indentation on the middle of its base like the impression of the head of a pin. See Harris' Treatise, page 44.

228. PUNCTULATED BUPRESTIS, *Dicerca punctulata*, Schonherr. (Coleoptera. Buprestidæ.)

Occurring mostly upon the pitch pine (*Pinus rigida*); an obscure coppery or black beetle, half an inch long, convex above with the tips of its wing covers tapering, and this narrowed portion more lengthened than in any of the foregoing species, their surface occupied with close fine punctures and double rows of coarse ones, the narrow spaces between these rows often elevated in places, the elevations forming smooth oblong spots or irregularly interrupted ribs; the thorax with coarser confluent punctures and with four elevated smooth stripes, the outer ones narrower and interrupted by a slight depression in the surface back of their middle; and finally, a smooth transverse elevation upon its front extending from one eye to the other, is a mark whereby this species may be readily distinguished from most of those related to it.

229. TUBERCULATED BUPRESTIS, *Dicerca tuberculata*, Gory.

Another beetle which is met with upon the pitch pine, and resembles an individual of the preceding species of a more brassy tint and having all its marks more coarse, rough and irregular; but the rows of coarse punctures on its wing covers are at equal distances from each other instead of being in pairs, the intervening spaces having many irregular elevated black polished spots, and the elevated transverse line upon the front is interrupted and less prominent, and its size is rather larger, being about 0.60 long.

230. Marked pine borer, *Monohammus notatus*, Drury. (Coleoptera. Cerambycidæ.)

Boring a cylindrical hole transversely in the interior of the wood, chiefly of decaying and dead trees and their logs and stumps, often doing serious injury to timber; a large white soft and flesh-like grub, nearly cylindrical, without feet and with numerous fine hairs of a fox red color, divided into fourteen segments by strongly constricted transverse sutures, the second segment larger than the others and flattened, horny and inclined obliquely downward and forward, the next ones very short, and all the following except the last one with a transverse oval rough space on their middle above and below; its pupa state passed in the interior of the wood; changing into a Long-horned beetle which gnaws its way out of the wood, forming a perfectly smooth round hole nearly large enough to admit the end of the finger; the beetle appearing in July, 1.05 to 1.20 long, with remarkably long slender tapering antennæ, nearly thrice the length of the body in the males, and shorter, little exceeding the length of the body in the females; its body brownish gray, on the wing covers freckled with small black spots interspersed with a few hoary white ones, which towards the base are often placed symmetrically; the thorax with but a few faint punctures and in its centre a polished black elliptic callous-like spot, and on the middle of each side a stout conic spine, which is coated around its base with hoary white hairs; the antennæ black gradually changing to clay yellow towards their tips, and not alternated with gray bands in either sex; the middle shanks with a tooth-like prominence on their outer edge beyond the middle, as in the two following species also.

This and the two following are the most common and pernicious borers which we have in pine timber, in the State of New-

York. On a still summer's night the peculiar grating or crunching noise which the larvæ make in gnawing the wood may be distinctly heard at a distance of eight or ten rods. That the insect does not open a passage out of the wood whereby to make its exit until it attains its perfect state, I infer from the fact that several of these beetles gnawed their way out of one of the pillars of the portico of a newly built house in my neighborhood, some years since, the noise being heard several days before they emerged, and whilst they were still at some distance in the interior of the wood.

When pine timber after being felled is allowed to remain in the forest through the summer months, it is liable to become much injured from becoming infested with these borers. They invariably make their exit from the wood upon its upper side, and the holes which they perforate becoming filled with water from every shower, the decay of the timber is rapidly accelerated. Experienced lumbermen are well aware of these facts, and are careful to peel the bark from logs that remain where they are cut, during the hot season of the year. The nidus in which the beetles deposit their eggs being thus removed, the timber escapes their attack.

The marks of this species and of several others related to it are so vague that it is very difficult to describe them in such a manner that they can be easily recognized and clearly discriminated. And hence authors have been much embarrassed and discordant in the names they have applied to this insect. It is the *Monohammus titillator* of Dr. Harris's Treatise. The specimens which I have are too obscure to enable me to form a decided opinion, but I doubt not Dr. Le Conte is correct in pronouncing the *titillator* of Fabricius to be a different species occurring only at the south; though he obviously errs in supposing the *dentator* of Fabricius to be the female of *titillator*, since Fabricius explicitly states that the antennæ in *dentator* are three times the length of the body. Mr. Kirby also regarded this as different from the *titillator*, and gave it the name *confusor*, in allusion no doubt to its having been confounded with that species. And this name becomes doubly appropriate in view of the remark justly made by Dr. Le Conte, that it is difficult to determine from Mr. Kirby's description whether this species or the following one is his *confusor*. Indeed it is only from the dimensions he assigns to it that we are assured this is the species to which he refers.

One of these insects in which the black spots upon the wing covers are more numerous and distinct than in any specimen which had previously fallen under my notice, obligingly flies into my room by night, at the very time I am copying this account for the press, and I hereby become assured of what I had previously been suspicious. The black spots in specimens that are newly disclosed from the pupæ and most fully marked, are chiefly of a square form, some of them oblong and others equilateral, and in such specimens it is plain to perceive that these spots are arranged in three rows running lengthwise upon each wing cover, the hoary white spots alternating irregularly with them in the same rows. In the specimen before me, the black spots, at least on the anterior half of the wing covers are so identical in their position and shape with the representation given in Drury's fig. 2, pl. 35, vol. ii, that no one can doubt its having been an insect of this species from which that figure was taken. Drury states that his specimen was received from Norway. Mr. Westwood, however, remarks that no such beetle is known to inhabit Norway or any other country of Europe. There is no doubt, therefore, that Drury's insect was either transported in its larva state in pine timber taken from this country to Norway, as might readily happen (i. e. if coals are ever carried to Newcastle), or else it was captured in New-York, in common with a large portion of the other insects in Mr. Drury's collection, and the ticket belonging to it becoming accidentally misplaced. Mr. Westwood notices the very near correspondence of Drury's figure with the *Lamia dentator* of Fabricius, the name. very likely, by which the species before us may be ticketed in his cabinet. We, however, are at a loss to understand why Mr. Westwood gives precedence to this Fabrician name, when that of Drury clearly has the priority, and must therefore supercede all those which have more recently been applied to this insect.

The synonyms of this species, it thus appears, are as follows:

Cerambyx notatus, Drury, vol. ii, Appendix. (Pl. 35, fig. 2),.. 1773

Not *Lamia notata*, Fab. Mant. ins. i, 139,.................... 1787

Not *Lamia titillator*, Fab. Species ins. i, 219, ... 1781
Monohammus titillator, Harris, Cat., ... 1835
do do Dejean, Cat. p. 367, ... 1837
do do Harris, Treatise, p. 87, ... 1842
do do do 2d ed., p. 93, ... 1852
do do Haldeman, Longicornia, p. 51, ... 1847
do do Melsh ? Smithsonian Cat. p. 109, ... 1853
Not *Lamia dentator*, Fab. Ent. Syst. ii, 278, ... 1792
Monochamus dentator? Westw. Drury, ii, 68, ... 1837
do *confusor*, Kirby, North. Zool. iv, 168, ... 1837
Monohammus confusor, Leconte, Jour. Acad. (new s.) ii, 148, 1852
do do Melsh. Smithsonian Cat., p. 109, ... 1853

231. Marbled pine-borer, *Monohammus marmoratus*, Randall.

A large white grub very similar to the last preceding one, and boring in the interior of the wood, often in the same trees and logs with it. The beetle coming abroad in July and very similar to the preceding, but always smaller, measuring 0.75 to 0.90 in length, and distinguished from it by having the short hairs coating the base of the spine on each side of the thorax of an ochre yellow color instead of white, the thorax with numerous confluent punctures across its middle, its wing covers ash gray marbled with tawny brown cloud-like spots, and punctured like the preceding species, but the punctures here becoming much more dense towards the base and running into each other, the antennæ in the females with an ash-gray band at the base of each joint, their length in the two sexes as in the preceding species.

232. White-scutelled pine-borer, *Monohammus scutellatus*, Say.

[Plate iii, fig. 7.]

A large white grub closely like the foregoing and boring in the wood in a similar manner, in the month of June producing a beetle of similar form but of a shining black color, its wing covers having small patches of short hairs here and there, resembling spots of white mould, their surface rough from coarse confluent punctures and the thorax similarly punctured across its middle, its base and apex with irregular transverse wrinkles, and its sides with a conical spine which is not clothed with hairs, the scutel coated over with white hairs, and the antennæ double the length of the body in the males, and in the females with a gray band on the base of each joint; its length varying from 0.60 to 0.75

283. FRAGRANT CALLICHROMA, *Callichroma suaveolens*, Linnæus. (Coleoptera. Cerambycidæ.)

Though I know nothing of its habits, as it closely resembles the foregoing insects in size, form, long slender antennæ, spiny thorax and some other particulars, though pertaining to a different section of this family, I here introduce a short account of a species which is decidedly the most splendid Long-horned beetle which we have in the United States—my attention having been recently directed to it from its having been sent me from west of Arkansas by my valued friend Wm. S. Robertson. A congeneric European species in its larva state very closely resembles the larvæ of the preceding insects and bores in the interior of trees like them, living in the willow.

The Fragrant Callichroma is an inch and a quarter in length or more, and its head and thorax are of a brilliant golden green, its wing covers bright blue-green, its breast brassy green, its antennæ and legs black with their thighs and the abdomen orange yellow. Its hind shanks are singularly compressed and sharp edged upon each side.

It appears in considerable numbers, some seasons, in the states bordering on the Gulf of Mexico, and on the West India Islands, and was long ago figured and described by Sir Hans Sloane, in his Natural History of Jamaica, (vol. ii., p. 208, pl. 237, fig. 40,) under the name of "The Musk Fly," or *Scarabæus Capricornis viridis suaveolens,* and he quaintly observes, "It smells very strong and not unpleasantly." A specimen was sent to Linnæus, from Carolina, by Doctor Garden, and was one of the last insects which were named and described by that illustrious man, who gave it, from Sloane, the name *Cerambyx suaveolens*, in the appendix to the last edition of his *Systema Naturæ*, vol. iii, p. 224, published in 1770. It also appears under the same name in Gmelin and in Turton, though by a clerical error of this compiler he and his translator state the shanks to be rust-red, instead of the thighs. I strongly suspect, however, that the *C. virens* of Linnæus and of Fabricius, of which a figure is given in the works of both Drury and Olivier, and the larva of which bores in the Rose-wood (*Amyris balsamifera*), will prove to be merely the other sex of *sauveolens*, and that that name having been first published must supersede this. Linnæus, however, with that species in his view, regarded this as different. Prof. Haldeman, in his history of the insects of this family gives this as the *C. elegans* of Fabricius, but from Olivier's figure and description of that species it is plainly another insect. DeJean, unaware that this species had been named and described gave it the name *Callichroma splendida* in his Catalogue, under which name Dr. LeConte has recently described it, and it is also entered under this name in Dr. Melcheimer's Catalogue lately published by the Smithsonian Institution.

234. PINE-EATING GAY-BEARD, *Eupogonius Pinivora*, new species. (Coleoptera. Cerambycidiæ.)

A small grub resembling a young apple-tree borer, mining the wood of the pine, and in July becoming a small cylindrical long-horned beetle, which is found upon the leaves, 0.25 long and about a third as broad, clothed with numerous erect black hairs on the body and antennæ, and grey ones on the legs; its color shining pale chestnut, with irregular oblique and transverse spots and streaks of gray on the wing covers, which are coarsely punctured, the punctures dense on the base and fine on the apex; its thorax narrower, slightly darker colored, closely punctured, having a very small tooth-like point on each side and along its middle a gray line which is widely interrupted in the centre, the sides and also the head with thin gray pubescence; its antennæ shorter than the body, coarse, and the joints becoming suddenly shorter after the fourth; its under side blackish brown, the legs pale chestnut.

This species is of the same color with *E. tomentosus* of Haldeman, which however is larger, with gray hairs instead of black, and the wing-covers with ochre-yellow spots and streaks.

235. COMMIXED LEPTOSTYLUS, *Leptostylus commixtus*, Haldeman. (Coleoptera. Cerambycidæ.)

A small Long-horned beetle occurring on the leaves of the pine in July, its appearance and shape closely like that of the Prickly Leptostylus No. 4, plate 1, fig. 4, and its larva probably having similar habits and the same form; the beetle 0.25 to 0.36 long, its thorax closely punctured, blackish obscurely varied with ash gray and with elevated black dots placed symmetrically. the sides convex and with a small angular tooth back of their middle; its wing-covers coarsely and closely punctured, dull and gray varied with paler gray and with black clouds and dots, two faintly elevated ribs on each wing-cover of a slightly paler gray tint alternated with black dots, the inner rib having an elongated black spot near its base, another beyond the middle, and a third one farther back, formed by obscure dusky transverse clouds which cross the ribs at these places; the sides black alternated with a whitish cloud-like spot near the base, and a smaller one near the middle.

I have met with this in a pine grove distant from any other trees, rendering it certain it had been bred in this wood.

236. **Pine Enderces**, *Enderces Pini*, Olivier. (Coleoptera. Cerambycidæ.)

A small cylindrical Long-horned beetle, having a wide separation between its thorax and abdomen, giving it some resemblance to an ant, 0.23 to 0.30 long, of a bright chestnut color, with its abdomen and the posterior third of its wing-covers black, the wing covers crossed obliquely forward of their middle by a silvery white line which does not reach to the suture, and posteriorly on the fore part of their black portion a gray band, which is placed in a shallow groove running obliquely and parallel with the silvery line; the thorax covered with fine impressed lines running lengthwise.

This is said by Olivier to have been found on pines around the city of New-York, but it is probably a southern insect. See remarks on this species in connection with the Currant borer, No. 134.

237. **Black-horned Callidium**, *Callidium antennatum*, Newman. (Coleoptera. Cerambycidæ.)

A flattened Long-horned beetle, appearing in May and June, about 0.52 long, of a deep Prussian blue color, often with shades of green in places, its antennæ and legs black, its thorax hairy, and as broad as the wing covers, with the sides strongly rounded and above on each side of the middle a little round hollow spot, and its wing covers rough from close shallow punctures.

Doctor Harris regarded this as identical with the European *C. violaceum*, deeming the latter to have been probably introduced into Europe from this country. See his Treatise, page 88. But entomologists now consider the insects of the two continents to be distinct species. Ours, doubtless, has the same habits with that of Europe, the larva living in the trunks of pines, excavating a wavy shallow track under the bark, which is packed full of sawdust, and when almost fully grown, sinking itself obliquely downwards several inches into the wood, to repose during its pupa state.

Specimens occur in which the thorax is plainly narrower than the wing covers, more distinctly punctured, and destitute of the two impressed spots. These are the Violet-colored Callidium, *C. janthinum* of Dr. Le Conte, and of Dejean's Catalogue. But individuals appear to occur of all intermediate varieties, and I am therefore inclined to think they can scarcely be regarded as constituting two distinct species.

238. PORTER HYLOTRUPES, *Hylotrupes bajulus*, Linnæus. (Coleoptera. Cerambycidæ.

A beetle very similar to the preceding in its shape and habits, appearing in July and August, 0.45 to 0.75 long, of a black color, its thorax nearly circular and clothed with white hairs, with a smooth polished black line in its center and a callous-like spot on each side of it, and its wing covers with very coarse shallow confluent punctures and some downy whitish spots forming two irregular bands near the middle.

This species is supposed to have been introduced in its larva state in timber from Europe, and is found in our country only near the sea coast. See Harris' Treatise, page 88.

239. PENNSYLVANIA PRIONUS, *Orthosoma Pennsylvanica*, De Geer. (Coleoptera. Cerambycidæ.)

A flattened Long-horned beetle, 1.00 to 1.30 long, and less than a third as broad, with its opposite sides parallel, its thorax twice as broad as long, and with three sharp teeth on each side, its wing covers with two or three slight elevated lines, its antennæ scarcely as long as the body, and its color chestnut red, darker anteriorly. Appearing from the beginning of July till into September, often entering open windows on warm evenings, and, as it flies, repeatedly hitting against the ceiling over head with a sharp click, and making a crashing kind of noise when it alights.

The larvæ which I suppose to be this species, but which I have never been able to succeed in rearing to its perfect state, is common under the bark of pine logs, and is a white, flattened, soft worm, scarcely three times as long as broad, slightly tapering from before backwards, its jaws or mandibles black, stout and tapering to a very sharp point, the two first rings of its body larger than the others and of a horny substance, the first of these rings longer that the second, tawny yellow, with a groove along its middle, the second broadest and tawny on its forward corners, the third and fourth rings short, together only equaling the fifth and following rings which are of equal length, and have an oval flat transverse elevation above and two elevated folds of the skin on each side, and with six small white feet anteriorly on the under side.

This common species has received a number of names from different authors, Foster having bestowed upon it that of *brunneus* in 1771, Drury *unicolor* in 1773, Fabricius *cylindricus* in 1781, Gmelin *cylindroides* in 1788, and Olivier *sulcatus* in 1795. Though I have not at hand the date of the volume in which De Geer's name was published, I suppose it to have preceded all the others.

240. HARRIS'S PRIONUS, *Tragosoma Harrisii*, LeConte. (Coleoptera. Cerambycidæ.

A beetle closely resembling the preceding, but with much shorter antennæ, only one tooth on each side of the thorax, and several raised lines on the wing covers.

This rare insect, which has only been found hitherto in New England and Newfoundland, inhabits New-York also, and I infer it to be bred in the pine, having in one instance met with the beetle, dead, under the loose bark of one of these trees.

241. RIBBED RHAGIUM, *Rhagium lineatum*, Olivier. (Coleoptera. Lepturidæ.)

Common in the pitch pine, several often in the trunk of the same tree, excavating a broad irregular patch in the outer surface of the sap wood, the cavity being mostly filled with sawdust; a yellowish-white grub about an inch long, divided into segments of nearly equal length and width, except the second which is the broadest, and the last which is narrowest with its end rounded; surrounding itself with a broad oval ring of woody fibres, like short threads, placed between the bark and the wood, in which to pass its pupa state; changing to a beetle which lies in the same cell through the winter and comes abroad in the spring; the beetle 0.40 to 0.70 long, long and narrowish, its head and thorax much narrower than the wing covers, cylindric, clothed with soft gray hairs upon a black ground, the thorax with a black stripe above and one on each side, where is also a stout spine; the antennæ only reaching the base of the wing covers, which are dull yellowish gray variegated with black, each with three elevated lines, the outer two uniting at their tips. See Harris's Treatise, page 102.

242. WOOD-ENGRAVER BARK-BEETLE, *Tomicus xylographus*, Say. (Coleoptera. Scolytidæ.)

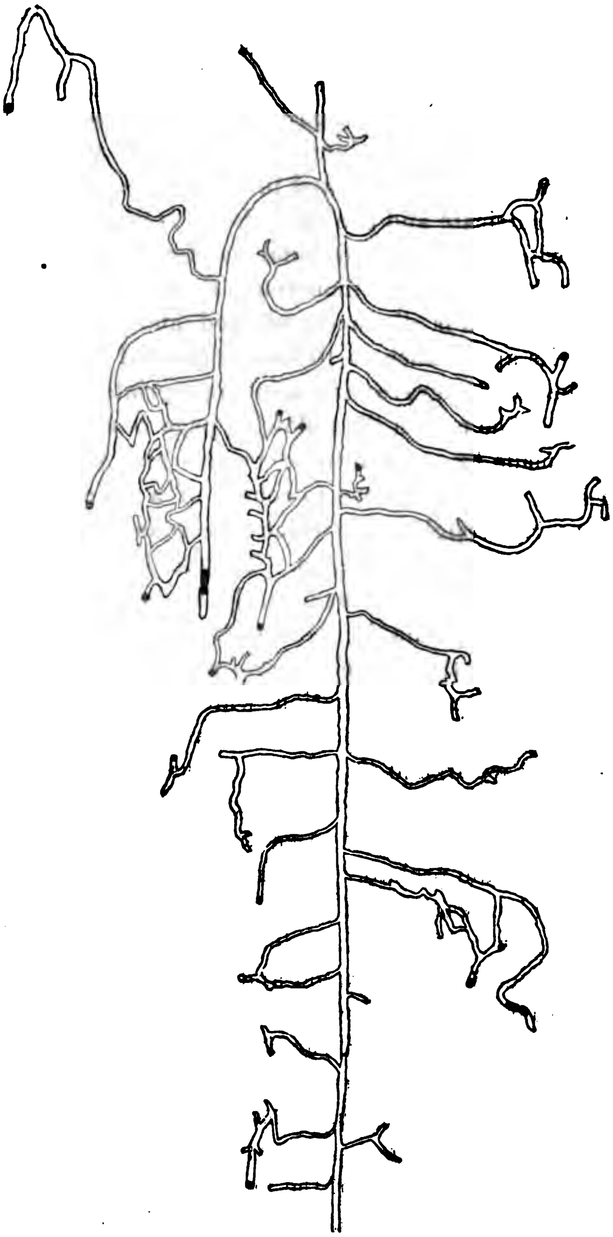
In the outer surface of the sap wood and inner layers of the bark, mining a long slender thread-like track, usually straight, lengthwise, four to eight inches long, from which numerous smaller short tracks branch off mostly at right angles; a small bark-beetle 0.12 long, which comes abroad mostly in May, of a chestnut color, the declivity at the tip of its wing covers having four or five minute projecting teeth upon each side.

This, like the other bark beetles, has a compact cylindrical body at least three times as long as broad, with the thorax forming almost half of the entire length and having the head deeply sunk in its anterior end and almost hid. Their antennæ are quite small and are composed of a long basal joint which becomes thicker towards its tip and is followed by five very small joints surmounted by a large round flattened club which is divided by sutures into three or four segments.

This species is glossy and bearded with fine hairs. Its thorax is shagreened anteriorly with minute elevated points which farther back become less dense, and the basal half is covered with fine punctures, with a smooth line above along the middle from the centre backwards. The wing covers have rows of coarse punctures and minute ones on the interstices between these rows, and their tips are abruptly declined as though cut or gnawed off, the outer margin of this declivity having four or five small projecting teeth upon each side. It is usually chestnut colored, with the antennæ and legs paler, but individuals may be met with of the following varieties:

Variety *a*, *nigricollis*. Thorax black.
b, *niger*. Thorax and wing covers black.
c, *fulvus*. Thorax and wing covers pale yellowish.

The wood-engraver bark-beetle is the most common and probably the most pernicious of all the insects infesting the forests of white pine in the State of New-York, and of yellow pine (*P. variabilis*) in the states south of us; and we are surprised that no notice of this important depredator is contained in Dr. Harris's Treatise. Whilst it is old and decaying or dead trees that most of the larger borers which we have described above attack, this small insect is liable to invade trees that are in full health and vigor, those that are young as well as old, mining beneath the bark and loosening it from the wood, so completely separating it that it breaks off in large pieces. Frequently, on elevating this loosened bark, its inner layers and the whole outer surface of the wood is found plowed in every direction, and the furrows are so intricate and confused that it is impossible to follow the track which any one individual has traveled. But in places where they have been less numerous, the work which each insect has performed is distinctly marked and is so regular and artistic in its appearance as to have suggested to Mr. Say the name of the wood-engraver as a most appropriate designation for this beetle. The cut on the following page is an exact copy of the tracks made by one of these beetles and its young, their natural size. It will be seen to consist of a main central track running nearly straight, from which numerous smaller short ones branch off at nearly right angles. Though I have not observed the habits of these insects sufficiently to be perfectly certain respecting all the points in their operations, the course they pursue in forming these tracks appears to be as follows: The female having selected a situation which will furnish suitable sustenance to her young, bores through the bark to the outer surface of the wood, and then mines a passage between the bark and the wood, in a straight line lengthwise of the tree or limb where no obstructions occur to cause her to deviate from her course. The male probably accompanies her and shares with her in this labor, each working by turns. Thus a long slender cylindrical gallery is formed, which is excavated about equally in the outer surface of the wood and in the inner layers of the bark. In some instances, two, three or even six tracks will be seen to start from one point, running in opposite directions, but always lengthwise of the tree or limb, and with lateral branches so similar to those in the figure, that I am in doubt whether they are the work of this or one of the other species which belong to this tree. Upon each side of the main track, little notches are excavated at intervals, whilst the work is in progress, similar to those represented in our figure of the tracks of the Pinebark beetle on a succeeding page, though larger than those, being



TRACKS OF THE WOOD-ENGRAVER BARK-BEETLE.

about equal to the width of the track in their length, but less in their width, and having their outer ends evenly rounded. In each of these notches from one to four eggs are placed. And as the beetles mine their way onwards, the fine dust which they form probably becomes strewed along the track behind them. Then, as they travel backwards and forwards in the burrow from time to time, the little stiff hairs with which their bodies are bearded, serve as a brush to sweep this dust into these lateral openings. Thus the mouths of these notches become filled and the eggs therein covered and concealed from any predaceous insect which may enter the burrow after the parent has completed her work and before the eggs have hatched and the young have mined their way beyond the reach of such enemies. The female continues her operations until her stock of eggs is exhausted, forming a burrow from four to eight inches or more in length.

The eggs of this beetle are about 0.025 long, of a broad oval shape and a watery white color. They may be met with in their newly formed burrows beneath the bark the fore part of June. They probably hatch in ten to twenty days, according to the temperature of the atmosphere at this time. The infantile larva is invariably found lying with its back towards the sawdust with which the notch in which it is bred is filled, its mouth being thus brought in contact with the soft innermost layer of the bark at the extremity of the notch—the elastic nature of the sawdust probably aiding in pressing its mouth against its destined nourishment. Thus it has only to part its jaws and close them together again to fill its mouth with food. And by repetitions of this motion a cavity is gradually formed between the bark and the wood, into which its head sinks, and afterwards its body. This cavity consequently takes a direction outwards at right angles with the central burrow. And thus the larva eats its way onward until it has obtained its growth, forming hereby a gallery varying in its length from about one to three inches, as the material consumed has been of a quality more or less nutricious, and winding and turning where impediments have been encountered or the track of another larva has been approached. Many of these lateral galleries, however, end abruptly before they are half completed, the worm having been destroyed by insect enemies or some other casualty. And it is curious to notice how these little creatures respect the territory which is already in possession of another, changing their course to avoid any encroachment thereon; and if one of them finds himself so surrounded and hemmed in by other tracks that it becomes impossible for him to refrain from encountering them, he so shapes his course as to cross his neighbor's road as nearly as possible at right angles instead of obliquely, thus intruding thereon as little and for as short a time as possible. Sometimes also two females happen to excavate their galleries parallel with each other, and so near that no adequate space remains between them for their young to mine their burrows, the beetles having been unaware of their proximity, no doubt, until too much labor had been expended to admit either one to abandon the ground and go elsewhere. In such cases the eggs are all placed along the outer side of each gallery, and thus the larvæ all mine their way outward in opposite directions to each other.

The larva is a plump soft white worm, broadest anteriorly, and with its body bent into an arch or having its tail turned partially inward under the breast. By transverse impressed lines it is divided into thirteen segments, the head being counted as one. Its head is polished and white, at least during the first periods of its life, with its maudibles chestnut brown, and no indications of eyes, and no feet, but with their places supplied by two small round retractile teat-like protuberances on the under side of each of the three segments next to the head. Having completed their growth, they sink themselves into the wood to repose during their pupa state. The small round hole which they perforate in the wood for this purpose, is seen at or near the outer end of each burrow in which the worm has lived to reach maturity.

The pupa resembles the perfect insect in its size and shape, with the rudimentary legs and wings enclosed in sheaths and appressed to the outer surface of its body in front. After taking on its perfect form it perforates a small round hole through the bark and comes out from the tree.

This and the other bark beetles of the pine have numerous insect enemies which wage incessant war upon them. Various species of small beetles pertaining to the families *Staphylinidæ*, *Histeridæ*, &c., are always to be met with under the loose worm-eaten bark of pines, and M. Perris has ascertained that these insects resort to this situation for the purpose of rearing their young, their larvæ being predaceous and subsisting upon the larvæ and pupæ of the bark beetles.

243. FINE-WRITING BARK-BEETLE, *Tomicus calligraphus*, Germar.

Under the bark of the pitch pine and other species of pine, mining long and often zigzag tracks lengthwise of the tree, these tracks having short, coarse, irregular branches; a chestnut-brown bark-beetle 0.18 to 0.22 long, cloathed with numerous yellowish gray hairs, its thorax rough anteriorly from close elevated points, and punctured posteriorly, its wing covers with rows of coarse punctures, their tip broadly excavated as though with a gouge-chisel, the surface of this excavation rough from coarsish punctures, and its margin on each side with five or six small unequal teeth. Appearing mostly in the month of May.

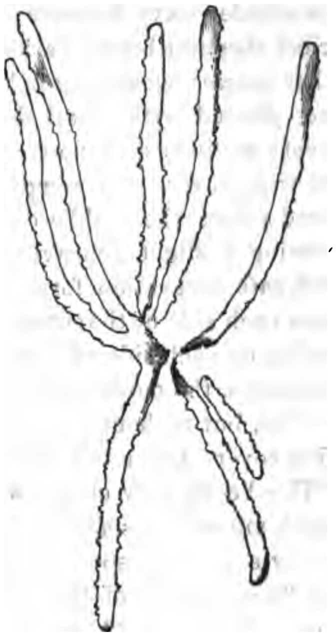
This species was originally named *exesus*, or the excavated bark-beetle, in allusion to the tips of its wing covers, in the old Catalogue of Rev. F. V. Melsheimer, under which name a short account of it was published by Mr. Say, in the year 1826. Germar, however, had described it two years before, under the name *calligraphus*, meaning elegant writer, which name it must retain, although not happily chosen, the tracks which this beetle forms under the bark being coarse, irregular, confused, and far less beautiful than those of many of the species of this genus.

It is in the pitch pine that this beetle mostly occurs in the State of New-York, but I have also met with it in the limbs of aged white pines, and farther south it is common in the yellow pine. Its burrow is somewhat like that of the preceding species, consisting of a single long furrow extending lengthwise of the tree or limb, from six to twelve inches in length, but it is less straight in this species, being usually curved more or less, and according to accounts it is often perfectly zigzag. The same notches are formed along its sides as noticed in the foregoing species, in which the eggs are deposited; but the lateral burrows which branch from the central one have no regularity whatever to them, being given off sometimes obliquely and sometimes at right angles, sometimes abruptly widening into a broad irregular flat cavity, and sometimes continuing of the same width through their whole length, either straight, irregularly wavy or tortuous, turning here and there, wherever an unoccupied space occurs into which they can be extended. These branches are usually of the same width with the central gallery, and like it are furrowed equally deep in the outer surface of the wood and the inner surface of the bark. The pupa state is passed in a cell excavated in the bark, and not in the wood, as in the foregoing species, and when changed into a beetle this cell is extended onwards through the bark for the escape of the insect. Being a larger species than the preceding the galleries which it excavates, and the holes it perforates through the bark, are proportionally larger. Several dead individuals may usually be found in the galleries of this as of the other species.

244. Pine bark-beetle, *Tomicus Pini*, Say.

From a common centre excavating several broad shortish galleries lengthwise of the trunk in opposite directions, resembling the spread fingers of a hand; a bark-beetle very similar to the preceding but of a smaller size, measuring only 0.15 in length, and with but four small teeth on each side of the concave declivity at the tips of its wing covers, and usually showing more or less distinctly an impressed line along the middle of the hind part of its thorax.

The tracks formed by this insect are so different from those of the other species that they are recognised at a glance. They occur under the bark of old trees of the white pine, and have some resemblance to the fingers of a hand spread apart, or to the track of a bird. From a common centre they run off in opposite directions up and down the tree, lengthwise of the grain, moderately diverging or nearly parallel with each other, appearing, when the bark is stripped off, like linear grooves in the outer surface of the wood and inner surface of the bark. They are about 0.10 wide and 1.50 to 2.00 long, all belonging to the the same cluster being of nearly equal length. Along the sides of these grooves several short sinuous excavations or notches appear, in which the eggs have been placed, where they would remain undisturbed by the beetle as it crawled backwards and forth through the gallery. The accompanying figure is a representation of one of the clusters of these tracks, copied from the surface of the wood. In this instance the commencement of some of the galleries and the principal part of the lower one on the right hand had been excavated wholly in the bark and thus made no mark upon the wood.



M. Perris has ascertained that with the European *T. Laricis*, which excavates several galleries from a common centre like the insect now before us, a male beetle is found in each of the galleries, whilst only one female is associated with them, she being stationed sometimes alone, in the centre, and at other times in one of the galleries in company with the male. And from his observations it appears that these galleries are excavated by the males, each of them being the work of one individual, whilst the female supplies the whole of them with eggs.

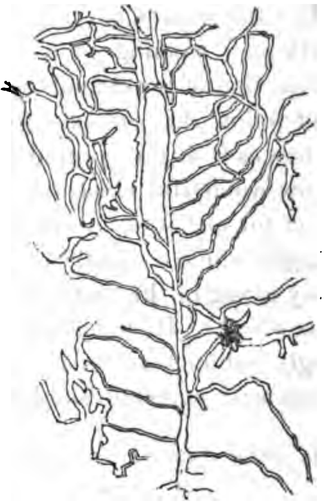
As there are no lateral galleries branching off from these main ones, I infer that the young of this insect move and feed along the sides of the galleries in which they are born, and that thus these galleries become widened and broad as we find them, their width being much greater than those of the other species, although the insect is but the usual size

245. **Little bark-beetle,** *Tomicus pusillus*, Harris.

Under the bark of small sapling pines, mining exceedingly fine slender wavy burrows running in every direction; a cylindrical chestnut brown bark-beetle much smaller than any of our other species, measuring only 0.06 in length, its surface shining and pierced with small deep punctures which on the wing covers are placed in close rows, the thorax but half as long as the wing covers and rough anteriorly from dense minute elevated points, the middle of the outer edge of the wing covers showing a slight concavity, the declivity at their tips with a moderate excavation formed by a smooth longitudinal groove upon each side of the suture, the suture itself being elevated and having on each side of it an impressed line in which are minute punctures, the outer margin of the declivity with numerous fine bristles, but without any projecting teeth, and the tips of the wing covers drawn out into a very small acute point.

This beetle very closely resembles the *T. ramulorum* of Perris, which mines the small twigs of European pines, but it is evidently a distinct species. It was described by Dr. Harris in the Transactions of the Natural History Society of Hartford, Conn., vol. i, p. 82, from a specimen imperfectly displayed, which he met with in the collection of Mr. Halsey, but he had no knowledge of its habits. And this I believe is the only notice of this insect which has hitherto appeared. Its minute size has probably caused it to be overlooked by collectors, although it is so common that the bark of dead young pines which are two inches in diameter or less, can seldom be broken away without coming upon its tracks, with some of the dead insects in them. Its tracks are readily distinguished from those of other species by their extreme slenderness, and being packed with fine white sawdust they resemble a tangled mass of small threads lying upon the surface of the wood. On coming to inspect them particularly, small irregular cavities will be noticed, one of which is represented by a knot-like appearance towards the lower part of the following figure on the right side. This cavity is appropriately termed the nuptial chamber by French and German writers. From it there are usually four galleries leading off in opposite directions and running obliquely to the grain of the wood, but curving, commonly, till they obtain a longitudinal direction. And from these numerous smaller and irregular wavy galleries branch off, at right angles or nearly so, and overspread the whole surface with a seemingly confused multitude of little furrows. The bark being quite thin in the young trees to which these beetles resort, their galleries are excavated mostly in the wood, the surface of which is deeply grooved whilst only a shallow impression is made on the inner surface of the bark. But at the end of each of the lateral galleries, a deep cavity will be noticed, sunk in the bark, in which cavities the insects repose during their pupa state.

The accompanying figure of the tracks of these beetles handsomely illustrates some of the facts which have already been stated above under the Wood-engraver bark-beetle, and it may interest the reader to notice some of the habits of these insects as shown by this figure. In its upper half two leading galleries are seen running parallel with each other and so near together that no adequate space exists between them for any young larvæ to form their burrows there without encroaching upon each other or crossing the tracks already made. The parent beetles appear to have been aware of this and accordingly so disposed of their eggs that all their young with but two or three exceptions mined outwards, traveling away from each other. Again, on the outer side of the left gallery two notches are observed, in which no eggs appear to have been placed, the parent beetle probably perceiving, what the figure indicates, that there was not suitable room to the left of these notches to duly accommodate all of the other larvæ that would traverse that spot. Furthermore, it will be noticed that of the burrows leading off to the right, above the large knot or nuptial chamber, the worm which excavated the fourth one, soon after commencing his journey, perceived



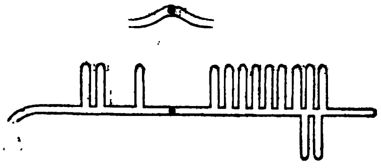
that the course he was pursuing would run his track into that of the third one. He hereupon abruptly alters his course, bearing directly away from the track of this neighbor until he has attained a suitable distance therefrom, and he then travels forward again, keeping at this exact distance from his neighbor's path. But this soon brings him into proximity with another neighbor upon the other side; and he now becomes aware of the fact that he is between two paths that are approaching each other, and that will consequently come so near together forward of him that he cannot proceed onward without running into one or the other of them. In this dilemma, to encroach the least that is possible upon his neighbors, he makes an abrupt turn so as to go square across one of these tracks. But this only serves to bring him into similar proximity with another track, and after this comes another and another; and now he reaches a fifth one, running in a different direction, requiring another alteration of his course to cross it at right angles. But we need not follow this subject further. Others also of these galleries when carefully inspected will be found scarcely less curious. How wonderful is nature, that thus presents an interesting subject for our study in each particular track an inch or two in length which a family of little worms make as they eat their way along in the bark of a tree, the parenchyma of a leaf, or elsewhere! How marvellous, that in such minute and seemingly unimportant and insignificant operations we invariably meet with so much to admire!

246. PINE TIMBER-BEETLE. ***Tomicus materiarius*, new species.**

In the interior of the sap wood, mining slender straight cylindrical burrows in a transverse direction, parallel with the outer surface, from which very short straight lateral galleries branch off at right angles above and below; a rather slender cylindrical black shining bark-beetle, 0.15 long, with pale dull yellow legs and antennæ, the fore part of its thorax and of its wing covers tinged with reddish yellow; the thorax equaling two-thirds the length of the wing covers, with a small elevated tubercle in the middle, forward of which it is rough from minute elevated points; the wing covers with rows of minute punctures, their tips rounded, the upper part of the declivity with a shallow longitudinal depression, or groove along the suture, forming a slight notch.

The insects belonging to the genus *Tomicus* and kindred genera of the same family by their habits divide themselves into two distinct groups. The larger portion of them reside in or immediately beneath the bark of different trees and are currently termed bark-beetles. But this designation is inappropriate for another portion of them which dwell in the interior of the wood, and there excavate their galleries. The name timber-beetles appears to be the most appropriate for these. Another point in which, from the observations of M. Perris, these two groups appear to differ in a remarkable manner, is the relative numbers of the two sexes. With the bark-beetles there are commonly several males in company with but one female, and the former appear to perform the chief part of the labor in the excavation of their galleries. With the timber-beetles, on the other hand, the females are much the most numerous, and probably mine their galleries without any assistance from the other sex. M. Perris states of one of the species, that upwards of fifty females were met with in the burrows they had excavated, without a single male being found there.

It is the habit of these timber-beetles to penetrate the tree in a straight line, passing inwards through the bark and into the sap wood to a depth of from half an inch to two inches, and then abruptly turning they extend their burrow in another straight line parallel with the outer surface and at right angles with the fibres of the wood, for a length of two to six inches. The only instance in which the burrow of the species now under consideration has come under my notice, was recently, in a billet of stove wood, which unfortunately did not contain the extreme end of the gallery. The annexed cut is an exact representation of this burrow, in which a live and a dead beetle were found, both of them females, and the only specimens of this species which have come under my observation. The transverse burrow was excavated in the sap wood at the depth of half an inch from its outer surface.



Near its middle it was crossed by another perforation extend- from the outside directly towards the heart of the tree, which is indicated by a black dot in the figure; and at this point the burrow curved slightly outwards towards the exterior surface, as represented in the section above the principal figure in the cut; and at its end on the left where it passed out of the billet of wood it commenced curving inwards towards the heart of the tree. Twelve lateral burrows of the same diameter as the transverse one extended upwards and two downwards, as shown in the figure, all of the same length, each one having been excavated probably by a single larvæ. The gallery of our insect thus differs widely from that of the European species (*T. eurygaster*, Erichson) which mines in the interior of the pine, which has no lateral burrows branching off from it.

The presence of these timber beetles in the wood can be distinguished from those which mine under the bark, by the little piles of sawdust which they throw out at the mouth of their burrows, this dust being so much more white and clean, and not composed in part of the brown or rust colored particles of gnawed bark which are intermixed with the dust produced by the bark-beetles.

In addition to the short description of this beetle which is given above, it may be observed that the head is finely punctured, the punctures on the face giving out small pale yellowish hairs, whilst those on the vertex or crown are destitute of hairs, and there is a slight transverse elevation of the surface between the face and the vertex, from which an elevated smooth line extends backwards along the middle of the vertex. Thorax, when viewed from above, with its base transverse and rectilinear, its basal angles rectangular, its opposite sides parallel for a distance equalling the length of the base, and from thence rounded in a semicircle at its anterior end; its surface anteriorly with minute asperities, which, viewed vertically, appear like fine transverse wrinkles; its basal half with very minute punctures, and in its centre a small transverse tubercle. Wing covers with fine shallow punctures in rows; the upper part of the apical declivity moderately depressed in the middle, producing a slight concavity in its outline when viewed from above anteriorly, the suture not elevated in this depression, but showing a slightly impressed line along each side; the hind end bearded with hairs similar to those upon the front. Under side black, the legs and antennæ pale dull yellow.

247. BORING HYLURGUS, *Hylurgus terebrans*, Olivier. (Coleoptera Scolytidæ

Perforating larger holes in the bark than any of the preceding bark-beetles, and mining curved galleries in every direction in the inner layers of the bark, and slightly grooving the outer surface of the wood; a cylindrical light chestnut red or yellowish fox-colored beetle 0.23 to 0.33 long, bluntly rounded at each end, thinly clothed with yellowish hairs, its thorax narrowed anteriorly and with coarseish shallow punctures, and a slightly raised line along the middle, at least on the posterior half, a faint blackish line along the middle of the upper part of the head, and its wing covers rough, with rather shallow furrows in which are coarse indistinct punctures. Appearing abroad early in May, numerous in pine forests and in lumber and mill yards. Its larvæ common under the thick bark of pine logs and stumps; a yellowish white footless grub thinly clothed with yellowish hairs, and divided into thirteen segments, its head polished and horny, of a tawny yellow color with the mouth black, and the neck having on each side, above, a large polished spot tinged with tawny yellow. See Harris's Treatise, page 75.

Neither the description of Olivier nor that of Dr. Harris clearly designates this species, and it is chiefly from its size and its commonness that I feel assured this must be the insect to which they refer. And I know not what the *Hylurgus rufipennis* of Kirby, which is indicated as being common through New-York and British America, can be, unless it is this same species, faultily described from discolored specimens.

248. PINE HYLASTES, *Hylastes Pinifex*, new species. (Coleoptera. Scolytidæ.)

A beetle which closely resembles the preceding and is frequently met with in company with it upon pine lumber in mill yards early in May, requires to be noticed in this place. I am unable to find any description of this species, although it is so common it can scarcely have been overlooked by authors till this time. It is the *Hylastes Pinifex*, or the pine-destroying Hylastes of my cabinet. Its habits are doubtless very similar to those of the Boring Hylurgas, but the beetle is always slightly smaller, measuring 0.20 in length, and is darker colored, being deep chestnut red or sometimes black tinged with chestnut. It moreover is destitute of the hairiness of that species, having only a thin fine short beard on the hind part of its wing covers. Its thorax and wing covers have the same sculpture with that. Its head shows no line along the middle, except upon the upper lip where is a slender short elevated one which ends before it reaches a slight transverse depression which crosses the lower part of the face. Its body beneath is black, the legs dark chestnut with the thighs commonly black. It moreover differs generically from the preceding in having seven instead of but four small joints in its antennæ between the long club-shaped basal joint and the knob at the tip, which knob is shaped like an egg and is divided by transverse lines into four short joints. Its shanks also have only fine denticulations along their outer edge near the tip, in place of the coarse saw-like teeth which are seen in the foregoing insect. It thus pertains to the genus *Hylastes* of Erichson.

249. Coal-black Hylastes, *Hylastes carbonarius*, new species.

A beetle so closely like the preceding that it merits to be noticed in connection therewith, is the *Hylastes carbonarius* of my cabinet. It is 0.20 long, of a pure black color, except its feet and antennæ which are chestnut red. Its face shows no transverse depression inferiorly, but has an elevated line along the middle, reaching a third of its length. The smooth line along the middle of the thorax is less distinct than in the foregoing species, being slightly if at all elevated, and the punctures of this part are more coarse. Its wing-covers are not bearded posteriorly, and its general form is plainly more narrow and slender than that of the Pine Hylastes. The only specimen I have seen was captured the middle of July, in the yard in front of my dwelling.

250. Pales Weevil, *Hylobius Pales*, Herbst. (Coleoptera. Curculionidæ.)

A large dark chestnut colored or black weevil 0.30 to 0.40 long, sprinkled over more or less with dots whereof one on the middle of the outer side of the wing covers is more bright, these dots being formed by fine short yellowish gray hairs. Quite common in May and June among pine trees and in mill yards and on piles of pine lumber; with its long cylindrical snout perforating the bark and crowding an egg into the hole, the larva from which, similar in its appearance to that of the white pine weevil No. 255, fully described on a following page, burrows beneath the bark, loosening it from the wood. See Harris's Treatise, p. 61.

251. PITCH-EATING WEEVIL, *Hylobius picivorus*, Schonherr.

A black weevil very similar to the preceding but destitute of any spots or dots, and having the same habits. This occurs in the southern part of our State, and becomes common farther south, but I have never met with it to the north of Albany See Harris's Treatise, p. 62.

252. WHITE-HORNED UROCERUS, *Urocerus albicornis*, Fabricius. (Hymenoptera. Uroceridæ.)

[Plate iii, fig. 2.]

A large black four-winged fly an inch long, having some resemblance to a wasp, but with a stout cylindrical body having the head and abdomen closely joined to the thorax, the base of the shanks and of the feet white, and also the antennæ except at their ends, and a spot behind each eye and another on each side of the abdomen, the wings smoky transparent. The abdomen ends in a point shaped like the head of a spear, below which is a straight awl-like ovipositor, about 0.40 long, with which it bores into the tree to deposit its eggs, the worm from which forms winding burrows in the wood, and is of a thick cylindrical form, divided into thirteen nearly equal segments, including the head, which is small, polished and horny, the last segment being largest of all and ending in a conical horn-like point, and the under side with three pairs of very small legs anteriorly.

These insects vary considerably in their colors and marks, and the two sexes are very dissimilar. The male, according to Dr. Harris, is black, with a white spot behind each eye, and a flattened rust colored abdomen. See Harris's Treatise, p. 427.

253. YELLOW-BANDED UROCERUS, *Urocerus abdominalis*, Harris.

A four-winged fly similar to the foregoing, about 0.80 long, of a blue-black color, with from two to four of the middle segments of its abdomen bright orange yellow, and also a broad band on the antennæ and the four forward legs except at their bases, its wings hyaline, tinged at the tips with smoky. There is sometimes a yellow spot behind each eye, and the hind knees and some or all of the joints of the hind feet are usually yellow. My specimens are males, nor has any female answering to this been found, and I am forced to entertain suspicions it is the true male of the preceding species. These insects are not common. See Harris's Treatise, page 428.

254. PINE BLIGHT, *Coccus Pinicorticis*, Fitch. (Homoptera. Coccidæ.)

Externally, upon the smooth bark of young trees, patches of white flocculent down-like matter, covering exceedingly minute lice invisible to the naked eye. See Transactions N. Y. State Ag. Soc., 1854, page 871.

AFFECTING THE TWIGS.

255. WHITE-PINE WEEVIL, *Pissodes Strobi*, Peck. (Coleoptera. Curculionidæ.)

[Plate iii, fig. 1.]

In May, depositing numerous eggs in the bark of the topmost shoot of young trees, the larvæ from which mine in the wood and pith, causing the shoot to wither and die, hereby occasioning a crook in the body of the tree at this point; an oblong oval and rather narrow weevil about a quarter of an inch long, of a dull dark chestnut-brown color, with two dots on the thorax, the scutel and a short irregular band back of the middle of the wing covers milk white, the wing covers also variegated with a few patches of tawny yellow.

This is a common insect in our State, and specimens of it may be found around and upon pine trees at all times of the year, but it is in the month of May that they are abroad in the greatest numbers, and it is chiefly at that time that their eggs are deposited. Young thrifty-growing pines are its favorite resort, and among these it selects those that are most vigorous, and whose topmost shoot has made the greatest advance the preceding year. But I have seen it so numerous that not only the topmost shoots of every tree in the grove, but many of the lateral ones also were invaded and destroyed by it.

It is in consequence of its smooth straight growth to such a lofty height that the pine has been prized beyond any other timber for large buildings and bridges, and is especially valuable for the masts of ships. So very highly were the American pines esteemed for this last purpose, at an early day, that they were ranked with the precious metals, and a large portion of the lands of the State of New-York were originally granted by the British crown, with an explicit reservation of "All mines of Gold and Silver, and also all White and other sorts of Pine trees fit for Masts, of the growth of twenty-four inches diameter and upwards at twelve inches from the earth, for Masts for the Royal Navy of us, our heirs and successors," under the stringent condition that "If they, our said grantees or any of them, their or any of their heirs or assigns, or any other person or persons by their or any of their privity, consent or procurement shall fell, cut down or otherwise destroy any of the Pine trees by these presents reserved to us, our heirs and successors, or hereby intended so to be, without the Royal Lycence of us, our heirs or successors for so doing first had and obtained, that then, and in any of these cases, this our present grant, and every thing therein contained, shall cease and be absolutely void, and the lands and premises hereby granted, shall revert to and vest in us, our heirs and successors, as if this our present grant had not been made, anything herein before contained to the contrary in any wise notwithstanding." Now the perfect straightness of the pine, which has adapted it so eminently for this important use, and has caused it to be thus valued, depends upon the healthy growth of its leading shoot for a long succession of years. If this leading shoot is destroyed the onward growth of the tree is checked until one of the lateral shoots starts upward and becomes the leading shoot. But this causes a crook in the body of the tree at the place where this lateral shoot originally arose, and thus the main value of the tree is destroyed. And it would appear to be a spirit of pure malevolence that instigates the White pine weevil to select the leading shoot of this tree in which to deposit its eggs, when its young can be nourished equally well in the lateral shoots, where they would do little injury, or perhaps would be a direct benefit to the tree by cutting off the ends of the branches, and thus promoting the upward growth of the main trunk.

The weevil deposits her eggs in the bark of the topmost shoot of the tree, dropping one in a place at irregular intervals through its whole length. The worm which hatches from these eggs eats its way inwards and obliquely downwards, till it reaches the pith, in which it mines its burrow onwards a short distance farther, the whole length of its track being only about half an inch. But such a number of young weevils are usually placed in the affected shoots that many of them are cramped and discommoded for want of room. The worm on approaching the pith often finds there is another worm there, occupying the very spot to which he wishes to penetrate. He hereupon, to avoid intrusion upon his neighbor turns downward and completes his burrow in the wood outside of the pith. Those also which enter the pith are often unable to extend their galleries so far as is their custom without running into those of others. When its onward course is thus arrested the worm feeds upon the walls of its burrow, until it obtains the amount of nutriment it requires and is grown to its full size.

The tree that is attacked continues its growth upward during the fore part of the season as usual, sending out from the summit of the shoot that is infested, a leading shoot with a number of lateral branches around its base. But the growth of these new succulent twigs is arrested and they begin to wilt and wither about the middle of July, the worms having by this time become so large and mined and wounded the stalk below to such an extent that its juices are exhausted and it fails to transmit any nourishment to these tender green shoots at the summit, which consequently dry up and perish.

If the affected shoot be now examined, little oval cells about 0.30 long, placed lengthwise of the stalk, will be discovered, all along its centre, so close in some places that their ends are in contact, and in other places more or less widely separated with the intervening space stuffed with sawdust; whilst here and there in the wood on each side of the pith similar cells show themselves. In each of these cavities lies a white glossy worm, its body soft, plump and curved into an arch, 0.30 long, and not quite a third as broad at its anterior part where it is broadest.

This *larva* is divided by transverse constrictions into **thirteen segments**, including the head, with the breathing pores forming a row of small round tawny yellow dots along each side. Its head is about half the width of the body, round, flattened, polished and horn-like, tawny yellow, with an impressed line along its middle, a faint whitish line on each side parallel with this, and a more distinct transverse arched white line anteriorly, and a minute black dot on each side representing the eye; the mouth darker colored, with the points of the mandibles slightly projecting, these organs being black, triangular, and with exceedingly minute sharp teeth along their inner edge. The neck has two smooth pale tawny yellow spots above. It has no feet, but their places are supplied by roundish elevations of the skin on the under side of the three segments next to the head. The surface shows a few very fine short hairs, particularly on the ends.

These larvæ change to pupæ and to perfect insects in their cells, the latter coming abroad mostly early in the spring. The short description at the commencement of this account will suffice to distinguish this weevil from all our other species. It varies in its length from 0.20 to 0.30. Dr. Harris thinks they are more than a year in obtaining their growth, but I am quite confident the eggs deposited in the spring become mature beetles by the following spring or earlier.

In midsummer, as soon as the shoot in which these insects are nestling becomes withered and dry, the thin bark covering it is commonly seen to be broken and peeled off in spots, or all its lower part is torn away, and newly perforated holes, larger than the mouths of the burrows of this insect, may be observed here and there in the wood. This is the work of small birds, which are very efficient and serviceable in ferreting out and devouring the larvæ and pupæ of this weevil. And in addition to these, it has several insect enemies which aid in restraining it from becoming excessively numerous. But notwithstanding the great inroads which are hereby made upon its ranks, this is quite a common insect in every part of our State and country where the pine abounds, deforming these valuable trees and retarding their growth. The proprietor of every grove of young pines should therefore make it a rule to examine them every year, in August or September, and cut or break off the top of every tree that is blighted by these weevils and commit it to the flames. With every shoot that is thus treated, from ten to fifty or more of these weevils will be destroyed, which otherwise will come abroad the following year to dwarf and deform a number of the other trees in the same manner. No one, on casting this subject over in his mind for a moment or two, will doubt but that a few hours devoted to such work, or a whole day, should it be required, will be time well spent, and labor that will be amply rewarded.

PINE MOTHS. Equally injurious with the White-pine weevil, though fortunately less numerous, are certain small moths pertaining to the family *Tortricidæ*, which appear to be identical in their habits with the *Retinia buoliana* and its kindred European species. These in their larva state erode the bark and the outer surface of the wood, at one of the uppermost whirls of twigs, causing a profuse flow of resinous sap, which, mingled with the castings of the worm, concretes and forms a covering, which hides and protects the depredator, as he continues his work, often completely girdling the main stalk and the bases of the branches which are given out at the same point. These large masses of hardened turpentine around and below the bases of some of the upper limbs may be noticed in every grove of young pines. The leading shoot is hereby often destroyed and the tree deformed similarly to the operations of the White-pine weevil. But I have not yet observed these moths sufficiently to attempt drawing up a history and description of them.

256. WHITE-PINE APHIS, *Lachnus Strobi*, Fitch. (Homoptera. Aphidæ.)

Colonies of plant-lice on the ends of the branches, puncturing them and extracting their juices, the bark of the infested trees having a peculiar black appearance; numbers of ants in company with them, and traveling up and down the trunks of the trees which they inhabit. The winged individuals 0.20 long to the tips of their wings, black, hairy, and sometimes slightly dusted over with a white meal-like powder, with a row of white spots along the middle of the abdomen, the thighs dull pale yellow at their bases, and the fore wings hyaline, with black veins, of which the forked one is exceedingly fine and slender. The wingless individuals far more numerous, 0.12 long, brownish black with a white line along the middle of the thorax and white spots along each side of the abdomen which are sometimes faint or wanting, the antennæ pale with their tips black.

The fluctuations which occur from time to time in the numbers of the plant-lice and the bark-lice are very remarkable. Three and four years since these parasites abounded on almost every kind of tree and herb in my neighborhood. The pines were everywhere thronged with this species. The present summer I have searched in vain for a colony of these insects; and other vegetation appears to be equally clean and free from vermin of this kind.

In autumn winged individuals of this species having the third vein of their wings but once forked are so common that on some occasions nearly half the specimens I have gathered have proved to be thus abnormal; and I was hereby misled by the first specimens I examined, which, happening to be of this variety, induced me to regard this species as intermediate between and partaking of the characters of both the genera *Eriosoma* and *Lachnus*, as stated in my description in the Catalogue of Homoptera in the State Cabinet of Natural History.

In many instances it is extremely difficult to decide whether the Aphides of this country are or are not identical with those which occur upon similar vegetation in Europe. I entertain strong doubts with respect to the present species being distinct from the *Lachnus Pini* of Linnæus. Heretofore, on carefully comparing specimens of these insects with the descriptions of *L. Pini*, given by Fonscolomb, Walker and others, I have sometimes been confident they were different, and at other times have been equally confident they were the same. Different colonies appear to vary, and it may be that here, as in Europe, we have more than one species of Lachnus inhabiting the pines. An investigation more extended and thorough than I have yet had an opportunity to give these insects is necessary to settle these doubts.

257. PARALLEL SPITTLE-INSECT, *Aphrophora parallella*, Say. (Homoptera. Cercopidæ.)

In June, a spot of white froth, resembling spittle, appearing upon the bark near the ends of the branches, hiding within it a small white wingless insect having six legs, which punctures and sucks the fluids of the bark, and grows to about a quarter of an inch in length by the last of that month, and then becomes a pupa of a similar appearance, but varied more or less with dusky or black, and with rudimentary wings resembling a vest drawn closely around the middle of its body; the latter part of July changing to its perfect form with wings fully grown, and then no longer covering itself with foam, but continuing to the end of the season, puncturing and drawing its nourishment from the bark as before. The perfect insect a flattened oval tree-hopper, 0.40 long, with its wing covers held in form of a roof, its color brown from numberless blackish punctures upon a pale ground, a smooth whitish line along the middle of its back, and a small smooth whitish spot in the centre of each wing cover, its abdomen beneath rusty brown.

The reasons why I regard this species as pertaining to the genus *Aphrophora*, to which Say had assigned it, instead of the genera in which it has recently been placed, will be found stated under a kindred species in my Third Report, No. 98.

258. SARATOGA SPITTLE-INSECT, *Aphrophora Saratogensis*, Fitch.

A similar insect with the same habits with the preceding, but differing from it in having the punctures uncolored, and the head above with its anterior and posterior margins parallel. It is of a lighter color than the foregoing, being pale tawny yellow varied with white. It is much more attached to the pitch pine than to the white pine, and is very common upon the small trees of that kind growing upon the sandy plains of Saratoga county.

AFFECTING THE LEAVES.

259. PINE CLASTOPTERA, *Clastoptera Pini*, Fitch. (Homoptera. Cercopidæ.)

Puncturing the leaves and sucking their juices, in July, a small shining broad oval tree-hopper 0.14 long, of a black color, its head pale yellow with a black band on its anterior margin, its thorax prettily sculptured with fine transverse lines and with a pale yellow band anteriorly, its wing covers with a broad hyaline white margin on the outer side, interrupted with black back of the middle and having a shining black dot near the tip, its under side and legs pale yellow.

260. TESTACEOUS CLASTOPTERA, *Clastoptera testacea*, Fitch.

A similar insect to the preceding, but of a pale yellow color, 0.20 long, its scutel darker tawny red or yellow, its wing covers with a shining black dot near the tip, and often with a black dot upon each side of the breast. Appearing upon pines and also on oaks the latter part of July and in August.

261. WHITE-PINE LEAF-HOPPER, *Bythoscopus Strobi*, Fitch. (Homoptera. Tettigoniidæ.)

Puncturing the leaves and sucking their juices in May, an oblong tawny yellow or yellowish brown leaf-hopper, 0.20 long, its wing covers inscribed with numerous blackish lines and dots, with a few small spots mostly on the outer margin, and crossed by three broad bluish white bands, its legs pale yellowish with numerous black dots from which arise small spines.

262. PINE CIXIUS, *Cixius Pini*, Fitch. (Homoptera. Fulgoridæ.)

Puncturing the leaves and sucking their juices in May and June, a brownish black four-winged fly, 0.23 long, its thorax diamond-shaped, with three elevated longitudinal lines, its fore wings transparent but not clear and glassy, stained with smoky yellow forming a few transverse spots, their veins white alternated with numerous black dots, its legs pale with the thighs brown.

263. VERNAL DIRAPHIA, *Diraphia vernalis*, Fitch. (Homoptera. Psyllidæ.)

Upon the leaves, puncturing them and sucking their juices, a small orange yellow four-winged fly, 0.15 long, with a square flattened head concave on its upper side and with a slight impressed line along the middle its whole length and a small notch in the middle of the anterior edge; the antennæ projecting forward from the anterior corners of the head, short and thread-like, of the same length with the head, their basal joint largest and forming one-fourth part of their total length, their tips black and ending in two short fine bristles of unequal length; the fore wings thick and leathery, feebly transparent, dull pale brownish yellow; the breast and hind breast coal black, and the legs dull whitish.

This, with the four preceding and the following species, were first described in my Catalogue of Homoptera in the State Cabinet of Natural History. At that time I had only met with this insect early in the spring, drowning in vessels of sap under the sugar-maple. I have since beat it from pine leaves, in every month of the year except August and those of winter. The name which I selected for it is therefore an unfortunate one, but cannot now be recalled.

This species clearly pertains to the genus *Diraphia* of M. Waga (Annals Soc. Entom. France, vol. xi, p. 275,) and is closely like the species he describes, but differs in its color and in not having the fore wings in the least more dusky at their tips.

264. BLACK-LEGGED DIRAPHIA, *Diraphia femoralis*, Fitch.

This differs from the preceding in having all the thighs of the same deep black color with the breast. It perhaps is only a variety of that species. The only specimen I have yet met with was beat from pine leaves the last of July.

265. CALAMUS DIRAPHIA, *Diraphia Calamorum*, new species.

In connection with the preceding I may notice two other species pertaining to the same genus, and showing our own country to abound in these insects, much more than Europe. I met with both these species the middle of May in the extensive tracts of sweet flag (*Acorus Calamus*) occupying the banks of the Raritan river two miles below New Brunswick, in New Jersey.

The Calamus Diraphia is 0.10 long to the tip of the abdomen in the dried specimen, and 0 15 to the tip of the wings. It is paler than the preceding, being of a dull gray or clay color, with the anterior lobes of its head of a red tint, and has no impressed line along the middle of the head. It is black beneath, with the abdomen and legs dull whitish, and in other respects it does not differ perceptibly from the Vernal Diraphia.

266. SPOTTED-WINGED DIRAPHIA, *Diraphia maculipennis*, new species.

This is a smaller species, measuring but 0.10 to the tips of its wings, and is tawny red, with the thorax tinged more or less with dusky, the antennæ with a broad black band towards their tips, the anterior wings more short and broad than in any of the other species, and hyaline with a broad smoky brown band on their tips, a spot back of the shoulder, and some freckles near the margin also smoky brown, the veins, including the marginal, all white alternated with numerous black rings, the breast and hind breast blackish, and the legs dusky brown tinged more or less with tawny yellow.

267. PINE-LEAF CHERMES, *Chermes Pinifoliæ*, new species. (Homoptera. Aphidæ.)

Stationary upon the leaves, usually towards their ends, puncturing them and sucking their juices, a very small black fly 0.08 long to the tip of its abdomen, and 0.12 to the end of its wings, which are dusky gray, its abdomen dusky red and slighty covered with fine cottony down.

The females of these insects do not extrude their eggs. Clinging closely to the leaf with their heads towards its base, they die, their distended abdomens appearing like a little bag filled with eggs. The outer skin of the abdomen soon perishes and disappears, leaving the mass of eggs adhering to the side of the leaf, but completely covered over and protected by the closed wings of the dead fly. I have met with the dead females thus adhering to the leaves the first of July, and have noticed the same insects on the leaves in full life and vigor the middle of May.

The rib vein of the fore wings runs straight to the outer margin forward of the tip, and gives off from its middle on the outer side a very oblique branch which runs to the outer margin, its tip producing a slight angular projection of the edge of the wing, and the whole space on the outer side of the rib vein beyond this branch is more opake than the rest of the wing and of a smoky yellowish color. From its inner side the rib vein sends off three simple oblique veins, the last one of which ends in the extreme tip of the wing. The hind wings have an angular point on their outer side beyond the middle, and a longitudinal rib vein, which, forward of its middle sends off a branch almost transversely inward, its tip curved backward. The antennæ are short, thread-like, and composed of four or five small joints. It will hence be seen that this insect is a true Chermes—the first species of this genus that has been discovered in this country.

268. PINE-LEAF SCALE-INSECT, *Aspidiotus Pinifoliæ*, Fitch. (Homoptera. Coccidiæ.)

Fixed upon the sides of the leaves, exhausting them of their juices; small oblong flattish white scales, with a pale yellow spot upon their pointed end. See Transactions, 1855, page 488.

269. CLUB-HORNED CAPSUS, ***Capsus clavatus*, Linnæus.** **(Hemiptera. Capsidæ.)**

In July and August, common on the leaves of this and other trees, puncturing them and subsisting on their juices, a small oblong black bug, 0.20 long, with three silvery white transverse lines on its wing covers, the middle one longest, the middle joint of its antennæ long and towards its tip thickened and black, the last joint slender and white with its tip black, and the hanches of its legs also white. This bug is equally common here as in Europe. Its marks are so peculiar as to remove all doubts of its being one and the same species which inhabits both sides of the Atlantic.

Several other species of bugs occur upon the pine, but as they are found in greater numbers upon other kinds of vegetation, it is scarcely necessary to notice them under this head.

270. PINE SPHINX, ***Sphinx Coniferarum*, Smith and Abbot.** **(Lepidoptera. Sphingidæ.)**

Eating the leaves of the pine and other evergreens, a large cylindrical worm checkered with brown and white spots, with a whitish line along the middle of its back and a short horn above on its hind part; burying itself in the earth to pass its pupa state, and producing a gray humming-bird moth, 1.75 to 2.75 in width across its spread wings, its fore wings with about three narrow indented brownish bands, a spot near the middle, one or two streaks beyond the middle and the veins near the hind margin also brown, its hind wings blackish gradually fading into gray towards the base, their fringe spotted with brown and white, its abdomen gray with the sutures brown. This species is extremely rare in the State of New-York.

271. PINE EMPEROR MOTH, ***Ceratocampa imperialis*, Drury.** **(Lepidoptera. Bombycidæ.)**

[Plate iii, fig. 4.]

Eating the leaves in September, a large cylindrical grass-green worm three inches long and as thick as one's finger, thinly clothed with soft shortish white hairs, each ring of its body with six elevated polished greenish white dots, the two uppermost ones more elevated, conical and ending in two or three minute prickles, those on the second and third rings always much longer, forming little horns varying from 0.10 to 0.25 in length, wrinkled and of a straw yellow color, its head polished pale lemon yellow with three black stripes, the two outer ones shorter, its hind end with a polished triangular black or blue-black spot in which are several elevated yellowish white dots, and a similar spot on the outer face of each of the hind legs; passing its pupa state a few inches under the ground, and the following June giving out a fine large moth, measuring from 3.75 to five inches across its wings, which are of a bright deep buff yellow color sprinkled with blackish dots resembling grains of gunpowder burnt under the skin, their basal fourth part reddish purple, varied with yellow, and a round central spot and beyond this a wavy scalloped band of the same color, that on the fore wings extending from the middle of the inner margin straight to the tip, these wings sometimes wholly reddish purple with only a large yellow spot on their outer margin from the middle to the tip, and a yellow cloud opposite it on the inner side.

Dr. Harris mentions this insect as inhabiting the button wood or sycamore only, but it is certainly the pine on which it is almost invariably found, in the northern states. At the south Abbot says it feeds on the button wood, oak, liquidamber and pine. It is remarkable that trees so widely different in their nature should be relished by this worm.

272. NIPHON BUTTERFLY, *Thecla Niphon*, Hubner. (Lepidoptera. Lycenidæ.)

[Plate iii, fig. 6.]

Feeding upon the leaves in summer, a flattened oval worm, 0.75 long when full grown, of the same deep green color as the leaves, with a light yellow stripe along the middle of its back and a white one on each side and a brown head; changing to a short thick grayish pupa with two rows of small blackish spots, and outside of these a row of more conspicuous rust-red ones, which is attached by its tail and by a thread around its middle in form of a loop; giving out a smallish butterfly which comes abroad in April and the fore part of May, 1.00 to 1.15 in width across its wings, which are of a dusky rust color and without spots above, paler grayish beneath, the fore ones with a dislocated black band beyond the middle, edged on its hind side with snow white, and beyond this a row of black crescents, each with a white spot in its concavity, and the hind wings similarly but more complexly variegated.

Boisduval says, "This insect lives in Georgia and Florida, on several species of pine, and is very rare and seldom seen in collections." It, however, is a common species in the State of New-York, in all our forests where pine trees abound, coming out with the first warm days of spring, before collectors are much abroad in search of insects, and continuing but a short time.

273. LECONTE'S SAW-FLY, *Lophyrus Lecontei*, new species. (Hymenoptera Tenthredinidæ.)

Clusters of cylindrical, slightly tapering worms with twenty-two legs may occasionally be noticed on pines, particularly those set in our yards for ornament, stripping the limbs which they invade of their leaves. They are the progeny of different species of saw-flies pertaining to the genus *Laphyrus*. One of these, which occurs upon the fir as well as on the pine, the transformations of which have been traced by Dr. Harris, will be found described on a succeeding page with the other insects of the fir and spruce. Another kind which I have noticed at different times, but have not yet had an opportunity to rear to its perfect state, grows to an inch in length and is white with two rows of oblong square black spots along its back and a row of broader square ones along each side, with the head and the six anterior legs also black. When nearly mature these worms are so large that the end of a single leaf of the pine probably furnishes them a very insufficient mouthful, hence two worms often unite, standing face to face, and thus hold the five leaves which grow from each sheath on the white pine pressed together in a bundle as they eat them, commencing at the tip and gradually stepping backwards as the leaves become shorter. It is only the old leaves of the previous year's growth which these worms consume, never touching the new ones at the outer end of the limb, hence they injure the tree much less than they would were they to strip the limbs they invade of the whole of their foliage. At least two broods of these worms appear annually, the one in July the other in September and October, the latter often remaining on the trees after frosty nights have occurred. Having finished feeding they leave the tree and inclose themselves in cocoons under fallen leaves or other shelter on the surface of the ground, in which they remain during their pupa state.

In addition to the Lophyrus described by Dr. Harris, four other North American species were described by the late Dr. Leach, the preparatory states of which are not known, but they doubtless feed upon the pine or fir as do all the species of this genus whose habits have been observed. I therefore subjoin a brief description of each of these species, as they may perhaps prove to be inhabitants of New-York.

A sixth species, larger than either of the others, is known to me. This, its size indicates, may very probably be the parent of the worms which I have described above. I name it in honor of our distinguished American entomologist, whose labors have added so vastly to our knowledge of the Coleopterous insects of our country.

Leconte's Lophyrus measures 0.38 to the tip of the abdomen and 0.48 to the end of the wings in the female, and it may at once be distinguished from all our other described species by the joints of its antennæ, which are twenty-one in number. It is shining dull tawny yellow, with the antennæ black and also the abdomen and base of the thorax. The under side is paler yellow, with two broad black stripes on the abdomen. The wings are smoky hyaline, their veins black. Captured the middle of May.

274. AMERICAN SAW-FLY, *Lophyrus Americanus*, Leach.

The female 0.42 long, clay colored with the abdomen darker, the antennæ black, with nineteen joints, the thorax spotted with black, and the wings hyaline with the forward pair slightly yellowish at least towards the base.

275. ABBOT'S SAW-FLY, *Lophyrus Abbotii*, Leach.

The female 0.30 long, rust colored, the head, under side and legs clay colored, the antennæ black and seventeen-jointed, and the wings hyaline with a slight tinge of yellowish.

276. FABRICIUS'S SAW-FLY, *Lophyrus Fabricii*, Leach.

The female 0.30 long, clay colored, the thorax spotted with black, the antennæ black and sixteen-jointed, and the wings hyaline with a slight tinge of yellowish.

277. PARTNER SAW-FLY, *Lophyrus compar*, Leach.

The female 0.33 long, black with pale shanks and feet, hyaline wings and sixteen-jointed antennæ.

278. PHILADELPHIA CHRYSOMELA, *Chrysomela Philadelphica*, Linnæus. (Coleoptera. Chrysomelidæ.) [Plate III, fig. 8.]

Feeding upon the leaves from May till September, a very convex broad-oval beetle about 0.30 long, of a dark bottle-green color with white wing covers sometimes tinged with yellow and having on them numerous spots and dots of dark green with a black line on the suture widened anteriorly and a second line parallel with this on each side, the antennæ and legs rusty red. This is also common upon willows, with other species closely similar to it.

279. PINE CHRYSOMELA, *Glyptoscelis hirtus*, Olivier. (Coleoptera. Chrysomelidæ.)

Feeding on the leaves in May and June, a thick cylindrical beetle resembling the Cloaked Chrysomela, No. 27, but with the pubescence much thinner than in that and the other American species of this genus. Its color is brassy, more brilliant on the under side and tinged with coppery. The male is usually 0.28 and the female 0.35 long.

In American collections of insects this is usually ticketed with the name *Eumolpus Pini*, under which Say described it. But it had long before been named differently by Olivier.

PINE. LEAVES.

280. White-necked Pine-beetle, *Dichelonycha albicollis*, Burmeister (Coleoptera. Melolonthidæ.)

A small beetle half an inch long or somewhat less and resembling the Rose bug, No. 50, in its shape but with wing covers of a shining brilliant green, becomes quite common upon pines about the middle of May, eating the leaves, and continues about a month. It may be distinguished from the several other species of the genus to which it belongs by its thorax having a more distinct but a very shallow groove along its middle.

This species has a black head with its fore part dull pale yellow. Its thorax is black and is covered with incumbent ash gray or yellowish hairs, but not so close as to hide the ground beneath, whilst the scutel is densely coated with white hairs. The bright green wing covers are dull pale yellow along their outer margin and also on their inner edge. They are rough from confluent punctures and show three smooth raised lines on each, running lengthwise. The legs are pale yellow with the hind feet and inner side of the hind shanks black or blackish, and the fore shanks have at their outer tips two projecting teeth with a small tubercle indicating the place of a third tooth. Its length varies from 0.40 to 0.50.

281. Pine Anomala, *Anomala Pinicola*, Melsheimer. (Coleoptera. Melolonthidæ.)

Feeding on the leaves in June and July, beetles resembling the common May beetle, No. 76, but of a much smaller size, being only 0.35 long, black, shining, their wing covers slightly tinged with chestnut with the suture and outer margin broadly black, their antennæ pale dull yellowish, and their feet pitchy black. I only know this species from specimens from the south, but as it occurs in Pennsylvania it will probably be found also in our own State.

2. THE HEMLOCK.—*Pinus Canadensis.*

This is much the most free from insects of any tree in our country. Its thick masses of foliage would appear to present a favorite lurking place for those insects which delight in a deep shade, and the collector is hence often allured to this tree; but it is very seldom that his beating net gathers anything from it. And I have never noticed any perforations made by insect larvæ in the wood or bark of this tree. The Porter Hylytrupes, No. 238, is however reported to sometimes attack the hemlock. Its bark, oftener than that of the apple or any other tree, is seen perforated with numerous holes in transverse rows, the work of the downy woodpecker (*Picus pubescens*, Lin.), and many persons suppose that this bird when it makes these holes is in pursuit of insects or their larvæ, lurking in or under the bark. But it is solely for the purpose of regaling itself upon the sweetish sap of the tree that it makes these perforations. The larvæ of the Pine emperor moth, No. 271, is said to feed upon the leaves of the hemlock as well as those of the pine, and the larvæ of some one or another of the smaller moths may occasionally be met with, eating the leaves. The Bound tree-bug, No. 100, and some others akin to it, sometimes occur on this tree, sucking the juices of the leaves it is probable. But what is most remarkable, I have never been able to find any plant-lice or bark-lice upon it, though I cannot but think it has some parasites of this kind belonging to it which future observations will detect.

3. THE SPRUCE AND FIR.—*Pinus* (*Abies*) *nigra*, *alba*, *et balsamea.*

The Porter Hylotrupes, No. 238 and the Golden Buprestis, No. 223, are recorded as borers in the trunks of these trees. A species of wooly Aphis is frequently located upon the green succulent twigs of the spruces standing in our yards, and I have also met with another plant-louse, pertaining to the genus *Lachnus*, in the same situation, but have never been able to find winged individuals, whereby to complete a description of these two species. The Pine Cixius, No. 262, is also detrimental to the leaves of the spruce, as is also the two following insects.

282. **Spruce-tree leaf-hopper**, *Athysanus Abietis*, Fitch. (Homoptera. Tettigoniidæ.)

Puncturing their leaves and extracting their juices the latter part of May and during the month of June, an oblong black shining leaf-hopper 0.20 long, tapering posteriorly and broadest across the base of the thorax, with a light yellow head having the mouth black and also two bands upon the crown the ends of which are often united, and commonly with a white streak on the middle of the inner edge of the wing covers, its legs being pale yellowish varied more or less with black. I first met with several specimens of this insect eleven years since, upon the black spruce and Fir balsam, on the summit of the Green mountains, in an excursion hither with that martyr of science, the late Prof. C. B. Adams. Since then I have repeatedly captured this same insect upon birch trees, distant from any spruces, and it is possible it might have been accidentally present on these latter trees in the instance first mentioned, there being numerous birch trees in the same vicinity.

283. FIR-TREE SAW-FLY, *Lophyrus Abietis*, Harris. (Hymenoptera. Tenthredinidæ.)

In June and July, stripping all the leaves from the ends of particular limbs of the spruce and the pine, clusters of cylindrical tapering worms with twenty-two feet and otherwise analagous to those of the pine, No. 273, but only about half as large and of a dirty green color with two darker green stripes along the back and two upon each side, their heads and six forward legs black; forming cocoons in crevices and under fallen leaves; the perfect insects appearing in May and again about the first of August: the females larger than the males and measuring 0.30 to the tip of the abdomen, of a yellowish brown color with a short blackish stripe on each side of the middle of the thorax, transparent wings, and antennæ with nineteen joints. See Harris's Treatise, p. 411.

I suspect Dr. Harris's observations upon this species were not full, and that like the analagous saw-fly which we have noticed on the pine, No. 273, there are two generations of this species annually; for we are informed that the perfect insect appears in May, producing a crop of worms in June and July, from the cocoons of which the perfect insect come out the last of the latter month. But Dr. Harris supposes the most of these cocoons remain unhatched through all the hot weather of August and September and the winter succeeding, to give out the flies which appear in May. It is much more probable, however, that the flies all come out of their cocoons about the beginning of August, and like the species we have seen on the pines, produce another brood of worms in autumn, which has escaped the notice of Dr. Harris; and it is these which lie in their cocoons through the winter and give out the flies which are met with in May.

4. THE CEDAR AND JUNIPER.—*Juniperus communis, etc.*

The wood of the red cedar (*Juniperus communis*) is in high repute as being most repulsive to insects, especially to moths and other vermin which destroy clothing, furs, collections of insects, &c., hence it is prized before all other kinds of wood for the manufacture of drawers and boxes in which such articles are to be stored. And yet this wood has its particular enemies among this class of animals, which, so far from being poisoned are fed and nourished by it. In the Museum of the State Agricultural Society a specimen of this wood may be seen in which is a large hole bored by some insect, probably a species of wood-mining bee, in which to place the cells for nurturing its young. Another, and no doubt the most important enemy of the red cedar, is the first of the following species:

284. CEDAR BARK-BEETLE, *Hylurgus dentatus*, Say. (Coleoptera. Scolytidæ.)

Perforating small pin-holes through the bark, and between it and the wood excavating long slender burrows with numerous branches leading off therefrom at nearly right angles, similar to those of the Wood-engraver bark-beetle, No. 242; a very small cylindrical dark brown bark-beetle, scarcely the tenth of an inch long, its wing covers rough from little elevated grains which are more prominent towards the hind part, and arranged in rows with impressed lines forming little furrows between them. See Harris's Treatise, page 77.

285. SIX-SPOTTED METACHROMA, *Metachroma 6-notata*, Say. (Coleoptera. Chrysomelidæ.)

Feeding on the leaves in July, an oblong pale shining beetle, 0.15 long, narrower anteriorly and punctured, the punctures in rows on the wing covers, becoming very faint towards their tips, and on each wing cover three black spots, the forward one long and narrow, the other two situated on the middle, parallel and almost in contact, the inner one placed rather farther back.

286. FACETIOUS LEIOPUS, *Leiopus facetus*, Say. (Coleoptera. Cerambycidæ.)

Feeding on the leaves in July, a small black Long-horned beetle 0.18 long, with long slender hair-like tawny yellow antennæ, their basal joint and the tips of two or three following joints black; its thorax with an ash gray stripe on the middle and an oblique one on each side of this, the hind ends of these stripes sometimes uniting and forming a letter W; its wing covers with a large ash gray spot forward of the middle and almost reaching the suture, having in it an oblique triangular black spot, and towards the tip an ash gray band concave on its hind side.

Mr. Say states that he obtained his specimens from the juniper, but its occurrence thereon was perhaps accidental, as I have found it on apple trees in a section of country where no juniper grows.

In addition to the foregoing there are probably one or more species of gall-fly belonging to the cedar, producing the roundish galls which we meet with on its leaves and twigs.

5. THE LARCH OR TAMERACK—*Pinus* (*Larix*) *Americana.*

The Pine bark-beetle, No. 244, is reported to mine the bark and outer surface of the sap wood of the tamerack the same that it does the pine.

In July and August troops of white caterpillars with black dots and along their backs eight black tufts of hairs, the larvæ of the Hickory tussock moth, No. 183, are sometimes found on this tree, nearly stripping the leaves from the limbs which they occupy.

LARCH.

287. Larch cheater, ***Planosa Laricis*****, Fitch. (Lepidoptera. Bombycidæ.)**

On the limbs in June and July, feeding on the leaves; a large flattened ash gray worm resting appressed to and closely resembling the bark; forming an oblong flattened gray cocoon moulded to the limb and resembling the bark in its color; the latter part of July producing a thick-bodied moth with thin delicate wings, which are almost transparent in the males and 1.00 broad, in the females 1.50, and of a white color with faint wavy dusky bands. See Transactions, 1855, page 494.

288. Larch Aphis, ***Lachnus Laricifex*****, new species. (Homoptera. Aphidæ.)**

Solitary upon the small twigs, stationed in the axils of the tufts of leaves, with its beak sucking the juices that should go to the leaves, a wingless brown plant-louse slightly tinged with coppery, 0.12 long, with a dull white line along the middle of its back and a similar whitish band at the sutures of each of the abdominal segments, in which bands on each side of the middle are three black punctures, the short tubercles on each side of the tip deep black, the under side dull white and dusted with white powder, the legs pale with the feet and knees black and also the apical half of the hind thighs and shanks, and the antennæ pale with black tips.

Many of these lice were noticed on a particular tree the latter part of May, but no winged ones were to be found. Ants, as usual, were guarding them and drinking the honey dew which they ejected. Many of them were accompanied with four or more young, huddled close around the base of the sheath from which the leaves arise. These were scarcely half the length of the parent, of a light dull yellow color with two brown spots above on the base of the abdomen, the legs and antennæ similarly colored to those of the parent but more pale.

289. Larch Chermes, ***Chermes Laricifoliæ*****, new species. (Homoptera. Aphidæ.)**

Solitary and stationary upon the leaves, extracting their juices, small black shining flies 0.10 long, having the abdomen dark green, the legs obscure whitish, the wings nearly hyaline with pale brown veins and the large stigma-spot upon their outer margin beyond the middle more opake and pale green. This is closely like the Pine Chermes, No. 267, but has the wings more clear. and differs also in some of the details of its colors.

FIFTH REPORT
ON THE
NOXIOUS AND OTHER INSECTS
OF THE
STATE OF NEW YORK.
BY ASA FITCH, M. D.
ENTOMOLOGIST OF THE NEW-YORK STATE AGRICULTURAL SOCIETY.

Copy-right Secured to the Author.

INSECTS INFESTING DECIDUOUS FOREST TREES.

Such a multitude of worms and other insects as feed on the leaves and other parts of our deciduous forest trees, I find it will be impossible for me to fully comprise in a single Report. I therefore here present the more common and pernicious ones, with a few others which are less common but whose history has never before been published. The oaks being our most important trees of this class, and attacked by a far greater number of insects than any of our other forest trees, will claim a principal part of our present Report.

1. THE OAKS.—*Quercus alba, etc.*

AFFECTING THE ROOT.

A disease to which the different kinds of oaks, in Europe, are subject, and to a less extent the beech and other forest trees, shows itself in the form of small excrescences or galls about the size of ground nuts, which grow upon the slender thread-like roots of the trees. These excrescences are caused by a small insect which punctures the root and forces an egg into the opening. The irritation which this egg occasions causes an increased flow of sap to the part, whereby it swells and grows into one of these gall-nuts. In the center of each of these nuts lies a small white footless worm, which eventually changes into an insect of the gall-fly kind, but which differs remarkably from all the other insects of the group to which it pertains, in being wholly destitute of wings. It has hence received the specific name *aptera*, and forms a distinct genus named *Biorhiza* by Mr. Westwood. I suppose this name to be derived, not from *βίος,, life*, as its orthography would indicate, but from *βία, injury*, and *ῥίζα, a root*, and if so it should be written *Biarhiza* instead of as we find it in books.

The roots of forest trees being so seldom exposed to our view, I know not whether similar excrescences occur upon them in this country. But it is quite probable that they do, since wingless gall-flies occur here, closely resembling that of Europe. I have repeatedly met with these in forests, upon the surface of the snow, on mild days in the fore part of winter. The warmth of the trunks of the trees melts the snow where it is in contact with them, as every woodman is aware, producing a crevice or vacant space down to the ground immediately around the tree; and I infer that it is through this opening that these insects ascend from the roots of the trees, and wander about upon the snow, to find and pair with their mates, after which they again descend to insert their eggs in the roots; for it is at this period of the year that their eggs are deposited, as we learn from seeing them frequently extruded by recently captured individuals. Their eggs are minute oval white grains, and are coated over with a glutinous white fluid, by which, when the female is impaled, they are held together in a continuous string. And this substance, in which the eggs of these as of other gall-flies are enveloped, is supposed by its acridity to produce the irritation of the vegetable tissues which causes the growth of the singular tubers and excrescences in which the young of these insects are cradled.

The genus *Biarhiza* is defined by authors as being destitute of wings and having the antennæ composed of fourteen joints in the females. It may further be added that these organs are thread-like and nearly as long as the body. The abdomen also is strongly compressed, as it is in the flea, to which insect these wingless gall-flies have considerable resemblance. When viewed in profile the abdomen is broad egg-shaped with its smaller end attached to the thorax; its sutures are marked by fine impressed transverse lines; and its first segment is very large, about equal in length to all the remaining segments. The abdomen is much more smooth and shining than the head and thorax, which are bearded with minute gray hairs, the head being broader than the thorax, and appearing about twice as broad as long when viewed from above.

We have in the State of New York three insects which will pertain to this genus as above characterized. One of these may appropriately be named from its color,

290. THE BLACK GALL-FLY, *Biarhiza nigra*, new species. (Hymenoptera. Cyniphidæ.)

This is of a black color throughout, including its feet and antennæ, and like the kindred European species, it is destitute of any vestiges of wings. It measures but eight hundredths of an inch (0.08) in length.

The two other species to which I have alluded, possess abortive or rudimentary wings, in the form of small whitish and feebly transparent scales, reaching about a third of the length of the abdomen. These scales are of a long oval shape, rounded at their tips, and are densely covered with minute punctures, and bearded with exceedingly fine short hairs. A straight sub-costal or rib-vein of a brown color, extends about half their length, parallel with the outer margin, and ends abruptly without curving towards the margin. The scales representing the hind wings are shorter and narrower than the forward ones. In addition to the difference now stated, the last segment on the under side of the body, from out the hind edge of which the ovipositor is protruded, is much more strongly elevated than in the preceding species, forming a kind of sheath for the ovipositor, and is fringed with rather long shining yellowish or golden hairs which project backward, resembling a little tuft or brush when the body is viewed from one side. These differences seem to require that these two insects should be regarded as generically distinct from the first, and I therefore propose the name *Philonix* (*φιλος, a lover; νιψ, snow*) for a genus for their reception. This genus coincides with *Biarhiza* in the number of joints to the female antennæ, which is the only sex yet discovered, but differs in having rudimentary wings and the ventral valve more prominently elevated and ciliated with longish hairs. It may further be observed that the jaws of these insects resemble those of an ant, being blunt at their tips, and three-toothed, the inner tooth more slender and deeply separated from the middle one, which latter is divided from the outer one by merely a slight notch. And their feelers or maxillary palpi are four-jointed, the two first joints cylindric, the third shortest and narrowed from its apex to its base, and the last joint slightly thicker than those which precede it, egg-shaped, and clothed with bristles, the two joints next to it also having a whirl of bristles at their tips.

291. YELLOW-NECKED GALL-FLY, *Philonix fulvicollis*, new species. (Hymenoptera. Cyniphidæ.)

This measures 0.13 to 0.15, and is the species which I have most frequently met with. It is black with the thorax tawny yellow, spotted anteriorly with black, the scutel brighter yellow, and the legs dusky or blackish with the knees and hips of a paler dull yellowish color, the antennæ being black to their bases. The thorax when carefully inspected shows a broad black stripe on its fore part, on each side of which is a small oval black spot, and farther down upon each side, forward of the wing-sockets, is a large triangular black spot.

These insects exhale a perceptible odor, resembling that of ants or bees. They are oftenest met with on the first snows that fall, in the latter part of November and the beginning of December, and wholly disappear, I think, before the close of the latter month. They are found in our forests, associated with the Thick-legged snow-fly, *Chionea valga*, Harris, and the little Snow-born and Mid-winter Boreus, *Boreus nivoriundus et brumalis*, Fitch; and it is a curious fact that these several insects inhabiting the surface of the snow, and pertaining to widely different orders, all correspond with each other in being destitute of wings. Why they are thus deprived it is difficult to conceive. They hereby resemble small spiders in their appearance, several kinds of which occur upon the snow in company with them. And it may be that they thus escape from being noticed and devoured by the birds, a few species of which, pressed by hunger, are industriously foraging our forests in winter.

292. BLACK-NECKED GALL-FLY, *Philonix nigricollis*, new species.

This is smaller than the preceding, being rather less than 0.12 in length, and is black with the basal third of the antennæ and the legs obscure brownish-yellow and the scutel dull yellow. The inner sides of its thighs are slightly dusky.

AFFECTING THE TRUNK.

293. Locust Cossus, *Cossus Robiniæ*, Peck. (Lepidoptera. Hepialidæ.)

Boring large holes in the solid wood of the different kinds of oaks and also in the locust, admitting the air and moisture to the interior of their trunks and causing their decay; a large cylindrical worm of a bright rose red color, with several purple pimples symmetrically arranged, each yielding a hair, its under side greenish white, with sixteen legs, and its head shining black; when fully grown three inches in length and as thick as one's finger, and then appearing of a dull flesh-color instead of red and its head tawny yellow; passing its pupa state in a cocoon in the tree, and coming abroad in June and July, a large thick-bodied moth of a gray color with a black stripe on each side of its thorax, and its fore wings with black clouds and a net-work of black lines, when extended measuring three inches in width; the male smaller and more colored with black, with the hind half of its hind wings bright orange yellow, its width 2.00 to 2.30.

Of all the wood-boring insects in our land this is by far the most pernicious, wounding the trees the most cruelly. The stateliest oaks in our forests are ruined, probably in every instance where one of these borers obtains a lodgment in their trunks. It perforates a hole the size of a half-inch auger, or large enough to admit the little finger, and requiring three or four years for the bark to close together over it. This hole running inward to the heart of the tree, and admitting the water thereto from every shower that passes, causes a decay in the wood to commence, and the tree never regains its previous soundness.

This is also a most prolific insect. The abdomen of the female is so filled and distended with eggs that it becomes unwieldly and inert, falling from side to side as its position is shifted. A specimen which I once obtained, extruded upwards of three hundred eggs within a few hours after its capture, its abdomen becoming diminished hereby to nearly half its previous bulk; and in the analogous European species more than a thousand eggs have been found on dissection. It hence appears that a single one of these insects is capable of ruining a whole forest of oak trees. This calamity, however, is prevented, probably by most of the eggs being destroyed, either by birds or by other insects, for these borers are by no means so common in our trees as the fecundity of their parents would lead us to expect.

An account of this insect was first given in the year 1818, in an article written by the late Prof. Peck, but published anonymously, in the Massachusetts Agricultural Repository, vol. v. pp. 67–73. Having bred the moth from larvæ which he found in the locust (*Robinia Pseud-acacia*) and ascertained its intimate relationship to the European goat-moth, named *Bombyx Cossus* by Linnæus and *Cossus ligniperda* by Fabricius, Prof. Peck bestowed the name *Cossus Robiniæ* upon our insect. Dr. Harris has also given an account of it in his Treatise, p. 316, under the name *Xyleutes Robiniæ*. This renders a few words of explanation necessary, to unscientific readers, particularly since in one or two instances heretofore I have followed Dr. Harris in sanctioning names which on more mature reflection I regard as invalid.

It is now a well established rule or law with men of science, that a specific name when once validly imposed upon any plant or animal can never afterwards be changed. This rule, however, was disregarded by Fabricius when he formed a separate genus to include the Goat-moth and other similar insects, as he took the name *Cossus* which Linnæus had given to that moth as the name for this new genus and gave another name to this species; thus in effect robbing Linnæus of the honor of having named and described this insect. Hubner, therefore, proposed the name *Xyleutes* for this genus, in order that the name *Cossus* might be restored to its typical species. But, on the other hand, it is to be observed that the law alluded to had no existence in Fabricius' day; the very course which he pursued was at that period the established rule, sanctioned by the example of his illustrious preceptor—Linnæus himself having in repeated instances selected his previous specific names as the names of genera of which those species were the types, hereupon giving new names to the species. Thus our common *Lampyris* (*Photinus*) *corrusca*, Linn., was originally the *Cantharis Lampyris*, Linn. Fabricius, therefore, so far from violating, conformed strictly to the received rules of his day in this matter. And to condemn him now, upon an *ex post facto* law, will be grossly unjust. Moreover, to cancel the several generic names which are in the same category with the one before us, and which have been universally current in our books for nearly a century past, will be too great an innovation to be tolerated, except the propriety and justice of such a step were perfectly clear. We hence regard the name *Cossus* as the legitimate designation of the genus to which the insect before us pertains.

Dr. Boisduval has recently described this moth as a new species, (Annales Soc. Ent., 2d series, vol. x, p. 323,) though under the same name, *Cossus Robiniæ*, he having doubtless found it thus ticketed in some of the Paris collections and being unaware that it had been previously described.

Prof. Peck states that he had repeatedly seen this same locust worm and its burrows in the wood of the black oak. Dr. Harris more cautiously says a larva which cannot be distinguished from this, occurs in the red oak. Having bred several of these moths from larvæ in the white oak, I have ascertained them to be identical with the species described as infesting the locust. And my observations lead me to the belief that, in the State of New-York at least, these insects are bred in the oaks to a much greater extent than in the locust, for I have never seen an instance of their large perforations in the wood of the locust, whilst in the oaks they have been noticed repeatedly, and for many years before I knew what insect was the culprit that occasioned this serious michief. I therefore enter it under this head. Fortunately this insect is not a common one. If it were so, few of the oaks in our forests could escape being ruined by it. From the specimens sent me from the southern and south-western states, I infer it to be more common there than it is with us. And we learn from Boisduval that it also occurs in California.

The European analogue of this insect is popularly termed the Goat or the Goat-moth, this designation having been bestowed upon it in consequence of the strong odor which it exhales, resembling that of the goat. Locust goat-moth might therefore be the most suitable common name for our insect, were it not that it is destitute of the odor alluded to, no perceptible scent being given forth either by the larva, or by the moth, even when the latter has newly burst from its pupa shell. I therefore deem the name Locust Cossus the most appropriate by which to designate this insect in common conversation.

This moth pertains to a small group or family named *Hepialidæ*, which is intermediate in its characters between the twilight or crepuscular moths and the nocturnal, and is usually arranged at the head of the latter in systematic works, preceding the large species forming the Bombyx family. The *Hepialidæ* are distinguished by having the spiral tongue, the palpi or feelers, and the spurs of the hind legs wholly wanting or very small. And the genus *Cossus* may be known by its tapering antennæ, which are as long as the thorax and pectinated or comb-like in both sexes, the branches or teeth being thick and short and continued to the tips of these organs. Authors usually state further that there is but a single row of these teeth to the antennæ ; but in this species there are two rows. The name *Cossus* which this genus bears, Pliny states was the name anciently given by the Romans to a worm found under the bark of the oak, which they were accustomed to fatten by feeding it meal, and to eat, it being esteemed a great delicacy.

Our moth comes abroad as already stated in June and the fore part of July. It flies only in the night time, remaining at rest during the day, clinging to the trunks of trees, its gray color being so similar to that of the bark that it usually escapes notice. In repose its wings are held together in the shape of a roof, covering the hind body. From observing her motions in confinement, I think the female does not insert her eggs into the bark, but merely drops them into the cracks and crevices upon its outer surface. They are coated with a glutinous matter which immediately dries and hardens on exposure to the air, whereby they adhere to the spot where they touch ; and if the short two-jointed ovipositor be not fully exserted as the egg is passed through it, so as to carry the egg beyond the hair-like scales with which the body is clothed, some of these touching adhere to it, their attachment to the body being so slight.

The eggs are of a broad oval form, and about half the size of a grain of wheat, being the tenth of an inch in length and three-fourths as thick, of a dirty whitish color with one of the ends black. When highly magnified their surface is seen to be reticulated or occupied by numerous slightly impressed dots arranged in rows like the meshes in a net. From the fact that several worms of the same size are sometimes met with in a single tree, indicating them all to be the progeny of one parent, it appears that the female drops a number of eggs upon each tree that she visits, and probably disposes of her whole supply upon a very few trees. The size of the eggs doubtless renders them a favorite article of food to some of our smaller birds. And a bird on discovering one of these eggs, will be incited thereby to search for others in the same vicinity, which search being successful, will be perseveringly continued so long as an egg can be found upon that or any of the adjacent trees. Thus it may be that of the whole stock of eggs which a female deposits, scarcely one escapes being picked up and devoured. This appears the most probable cause of so few of these worms being met with, although the females are so prolific.

The worm on hatching from the egg sinks itself inward and feeds at first on the soft inner bark, till its jaws acquiring more strength, it penetrates to the harder sap-wood and finally resorts to the solid heart-wood, residing mostly in and around the centre of the trunk, boring the wood here usually in a longitudinal direction, and moving backwards and forth in its burrow, enlarging it by gnawing its walls as it increases in size, whereby the excavation comes to present nearly the same diameter through its whole length. In an oak in which I met with two worms fully grown and several others but half grown, the whole of the central part of the trunk had been extensively mined by preceding generations of this insect and was in a state of incipient decay. And I thus had an opportunity to notice the fact that none of the worms were lying in the decaying wood, all being outside of this, where the wood was still sound. Hence it is evident that it is living healthy trees which this insect prefers, and not those which are sickly and decaying; which latter are preferred by the European Cossus, some authors say, though perhaps their observations have not been exact upon this point; for in the instance here alluded to, it would have been said on a first glance that these worms preferred decaying wood, since the diseased heart of the tree was everywhere traversed with their burrows, and the sound wood showed few of them. And thus no doubt in many other cases we mistake the cause for the effect, and on seeing semi-putrid wood filled with worm-holes we suppose the worms have preferred wood of this character when in truth it is these holes which have caused the decay of the wood.

These worms are probably three years in obtaining their growth. They cast off their skin several times, and after the last of these moultings their color becomes different from what it has previously been.

The LARVA previous to the last change of its skin is of a rose red or a pale cherry red color, often with a faint yellowish stripe along the middle of its back, on all except the three anterior rings. It is of a cylindrical form, slightly broadest anteriorly and a little flattened beneath. It is divided by transverse constrictions resembling broad shallow grooves, into twelve rings, which are twice as broad as long. On each of these rings are a few pimples of a deep purple color, regularly placed, each giving out a pale brown bristle. Four of these pimples are on the back, placed at the angles of an imaginary square or a trapezoid having its hind side the longest, the two hinder pimples being larger. Small white dots confluent into broken lines may also be perceived, forming a transverse square in which the two anterior pimples are inclosed, and other dots less regularly placed, surrounding the two hind pimples except upon their hind side. Above the breathing pores on each side is also a large pimple, which, upon the four rings bearing the pro-legs, has a white dot in its lower edge, which dot does not appear in the corresponding pimples of the other rings. A minute pimple is also seen forward of the upper end of each breathing pore, below which all the under side of the worm is greenish white. The breathing pores are oval and light yellow, with a rusty brown oval spot in their centre and a dark purple ring around their outer edge. Below them the skin bulges out, forming a longitudinal ridge, or rather two parallel ridges divided by a deep intervening furrow. Upon the upper one of these ridges near the middle of each ring is a round cherry-red spot in which are two small pimples, and on the lower ridge is a single one, placed farther back, whilst four others, equally minute, may be seen farther down and around the anterior base of the pro-legs. The second and third rings are shorter, each with fourteen pimples of different sizes, the larger ones forming a single transverse row. The first ring or neck is polished and of a dark tawny brown color on its upper side, with a white line in its middle disappearing anteriorly in a black two-lobed cloud. The head is but half as broad as the body, and is of a shining black color, tinged more or less with chestnut brown in its middle, with scattered punctures from which arise fine hairs. The antennæ are chestnut brown, conical and three-jointed, the last joint minute, with a bristle beside it given out from the apex of the second joint. The palpi are similar, with two small processes from the summit of their second joint, the outer one of which ends in a minute fourth joint. Of the eight pairs of legs, the three anterior are conical and end in a single chestnut-colored claw. The others are short, thick and retractile, with their soles surrounded by a blackish fringe-like ring composed of a multitude of minute hooks, the last pair, however, having these hooks only around the anterior and outer half of their soles. Placed in a glass or tin vessel this worm is perfectly helpless, being unable to cling with these hooks to a hard smooth surface.

With the last change of its skin it loses its bright red color and is then white, tinged with green at the sutures, and with a pale green stripe along the middle of its back which disappears at the sutures. The pimples are of a pale tawny yellow color with black centres. The head is light tawny yellow varied in its middle with greenish white, its anterior edge blackish and the jaws deep black.

As the moth into which this worm changes possesses no jaws or other implements by which it is possible for it to perforate the wood, it is necessary for the worm to prepare a way for its future escape from the tree. And the provisions which it makes for this end are truly interesting, indicating that the worm has a clear perception of what its future condition and requirements will be, both in its pupa and its perfect state. This is the more surprising when we recur to the fact that since its infancy this creature has been lying deeply bedded in the interior of the tree, the only act of its life having been to crawl lazily around in its cell and gnaw the wood there, when impelled by hunger. How does it now come to do anything different from what it has been doing for months and years before? But, having got its growth and the time drawing near to have it change into a pupa or chrysalis, we see it engaging in a new work. It now bores a passage from the upper end of its cell, outward through the wood and bark till only a thin scale of the brittle dead outer bark remains. It is usually at the bottom of one of the large cracks or furrows in the bark that this passage ends, whereby the hole inside is less liable to be discovered by birds. The worm then diligently lines the walls of this hole with silken threads interspersed with its chips and forming a rough surface resembling felt, as it withdraws itself backwards for a distance of about three inches, thus placing itself beyond the reach of any bird or other enemy outside of the tree, should its retreat be discovered. And it here incloses itself in a cocoon which it spins of silk, of a long oval form, having the end towards the outer opening much thinner and its threads more loosely woven. In this cocoon it throws off its larva skin and then appears in its nymph or pupa form.

The PUPA is an inch and three-quarters long and half an inch thick, of a dull chestnut color, the rings of its abdomen paler, and on the back near the anterior edge of each ring is a row of angular teeth, resembling those of a saw, of a dark brown color, and all of them inclining backward, these rows of teeth extending downwards upon each side below the breathing pores or about two-thirds of the distance around the body. On the middle of each ring is also a much shorter row of little tubercular points. Finally, upon the under side of the last segment are about four stouter conical teeth, the tips of which are drawn out into sharp points which are curved forward, so that when this last segment, which is tapering and smaller than the others, is bent downwards, these curved points will catch and hold the body from moving forward.

The pupa lies perfectly dorment in its cocoon probably a fortnight or longer. It then awakes from its slumbers and begins to writhe and bend itself from side to side. By this motion the rows of little teeth upon the rings of its abdomen, which incline backward as above described, catch in the threads of the cocoon, first upon one side and then upon the other, and thus move the body forward, whereby its head presses upon the loosely woven end of the cocoon, more and more firmly, until it forces its way through it, and the pupa works itself forward out of its cocoon. And the same writhing motion being continued, the teeth now catch in the threads with which the sides of the hole are lined, and thus though destitute of feet the pupa moves itself along, till it reaches and breaks through the thin scale of bark which hitherto has closed the mouth of its burrow, and pushes itself onward till about three-fourths of its length protrude from the tree, when by curving the tip of its body downward, the four little hooks thereon catch in some of the threads and hold it from advancing further and falling to the ground. By so much motion of the pupa the connections of the inclosed insect with its shell become sundered and the sutures of the shell are probably cracked open, so that the moth readily presses them apart and crawls out therefrom, leaving the empty and now lifeless shell projecting out from the mouth of the hole, with a small mass of worm-dust surrounding it.

The MALE moth is of a gray color from white scales intermixed with black ones. The *head* is furnished upon the crown or vertex with longer or hair-like scales. The antennæ are tapering and many-jointed, their basal joint thickest and covered with black and gray scales, the remaining joints being naked, shining, coal-black, each joint bearing two branches on its front side, forming two rows of coarse teeth like those of a comb, the teeth being six or more times as long as thick, and all of the same length except at the base and tip, where they become shorter, all of them cilated with fine hairs. The feelers are appressed to the face and reach as high as to the middle of the eyes, and are cylindric, clothed with short appressed scales, the separation of the terminal joint being slightly perceptible. The *thorax* has the shoulder-covers black, forming a stripe of this color along each side, which anteriorly curves downwards and is continued backward upon the upper side of the breast. Its base is clothed with larger scales, forming tufts upon each side. The *abdomen* is conic and equals the tips of the wings in its length, and is but slightly covered with scales except along each side, where they form a broad stripe, the under side being entirely denuded; it is black and shining, with the sutures dull yellowish. At its tip are three appendages, longer than the last rings of the abdomen. The two lower ones are broad thick flattened processes of a dull brownish yellow color, with their tips rounded and slightly bent inwards towards each other. The upper one is a slender black shining hook or claw of the same length, its tip sharp-pointed and curved downward. Above these appendages and hiding them from view is a brush of black hairs, forming a conical tuft at the end of the abdomen, blunt at its apex. The *legs* are more or less denuded of scales, black and shining, with the hind shanks thicker towards their tips and with two pairs of spurs, the forward shanks having only a single spine which is placed on the middle of their inner sides, the same as in other moths; and the feet are compressed, and five-jointed, with the basal joint longest and the following ones successively shorter. The *fore wings* are black with groups of whitish scales forming gray spots or clouds which are netted with black lines, varying greatly in different individuals. Often a transverse gray spot is situated towards the base and another on the anal angle, the outer and hind margins being gray alternated with black. The *hind wings* are black with their posterior half of a rich marigold yellow color bordered with a black line upon the hind margin, the yellow color being irregularly notched on its anterior side and narrowed to the inner angle, and not extended to the outer angle, the two outer cells being black. The outer or anterior margin, except at its base and tip, is usually gray alternated with transverse black streaks and blotches, and inside of this is a large ash-gray spot occupying the outer anterior part of the disk. The under sides of both wings is similar to their upper surface.

The FEMALE would not be supposed to pertain to the same species with the male, her size is so much larger, her colors so much paler gray, and her hind wings being wholly destitute of the bright yellow coloring which forms so conspicuous a mark in the other sex. The branches of her antennæ are also shorter, being but about four times as long as thick. The ground color of her fore wings is gray, variously netted with black lines dividing the gray in places into small roundish spots and into rings having black centres. The black color usually forms a broad irregular band across the middle of the wings parallel with the hind margin, and another between this and the hind edge, chiefly on the outer half of the wing, the hind edge and fringe being whitish alternated with black spots placed on the tips of the veins. The hind wings are dusky gray and towards their bases blackish, their posterior half being feebly transparent and faintly netted with darker lines. The body is densely coated with gray scales, its under side hoary white; and the legs are gray with black bands on the shanks and black feet with gray rings at their articulations.

We have but a single suggestion to make upon the subject of remedies against this truly formidable though fortunately rare enemy. It is probable that soft soap applied the fore part of June to the bodies of trees will be equally efficacious against this and other borers as it is against that of the apple tree. This remedy may well be resorted to, to protect the locusts and oaks which we value as ornamental trees; and scarce and valuable as timber is becoming in all the older settled sections of our country, I doubt not it will be found to be good economy to bestow similar attention upon the more valuable trees standing in our forests.

It should also be observed that whenever a hole made by a borer is discovered in the trunk of a tree, it should be immediately closed by inserting a plug therein, to exclude the wet which will otherwise be admitted hereby to the interior of the tree and produce a decay of the surrounding wood.

294. OAK COSSUS, *Cossus Querciperda*, new species.

A moth smaller in size than *C. Robiniæ*, with thin and slightly transparent wings which are crossed by numerous black lines, the outer margin only of the forward pair being opake and of a gray color; the hind wings of the male colorless, with the inner margin broadly blackish and the hind edge coal-black.

This description will suffice to distinguish a species of which the two sexes were recently found at rest upon the trunk of an oak tree in Schoharie, by I. A. Lintner, Esq. It is altogether probable from these facts that it is a borer in the oak, with other habits similar to those of the preceding species. This discovery is the more interesting, since, so far as I am aware, the Locust Cossus has hitherto been the only species of this genus known as inhabiting our country, the *Cossus Pyrini* of Fabricius evidently pertaining to the genus *Zeuzera.*

The PIGEON TREMEX, *T. Columba,* I have met with inserting its eggs in the oak, but being much oftener found in the maple, will be described under that head.

295. NORTHERN BRENTHUS, *Arrhenodes septentrionis,* Herbst. (Coleoptera. Attelabidæ.)

Perforating a cylindrical hole about the tenth of an inch in diameter, transversely through the bark and into the solid wood of standing, and much more often of newly felled trees, and thrusting its chips out at the orifice; a slender cylindrical whitish worm an inch or more in length and scarcely 0.10 in diameter, with three pairs of legs on its breast and a thick fleshy pro-leg at its tip, its last segment horny and dark chestnut colored, and obliquely hollowed at its end, forming a kind of scoop with little teeth along its edge; changing in its burrow to a long yellowish white pupa, having its head bent down under its breast and its long beak lying between its leg and wing-sheaths, its back with transverse rows of little sharp teeth and two sharp spines at its tip; changing into a long cylindrical beetle about 0.60 in length, of a mahogany brown color, it wing-covers usually black and with narrow tawny yellow spots upon the rounded spaces between the furrows, its thorax egg-shaped and highly polished, its head ending in two large jaws in the male, and in the other sex a slender cylindrical beak with small jaws at its tip, whereby it bores into the bark and then pushes an egg into the opening.

Though most common in oaks this beetle is not limited to wood of this kind. On removing the loose bark from fallen trees it will sometimes be seen projecting partly out of its burrow in the wood; but the collector will most readily supply himself with specimens among the piles of sawed oak lumber in mill yards in May and June. It differs remarkably in its size. I have a specimen the total length of which is but 0.25, and which is proportionably slender. It was one of these dwarfs from which Drury described this species under the name *minimus,* long anterior to Herbst. But this being the name of a mere variety, it cannot supplant the name subsequently given, which has been universally adopted and is highly appropriate, since the several species nearest akin to this all inhabit warm climates. And Olivier hence deemed South Carolina to be the northern-most extent of the geographical range of this species, and that the name given it by Herbst was therefore inapplicable. He consequently proposed the name *maxillosus* for this species. The insect, however, occurs in all parts of the United States and Canada.

296. GRAY-SIDED WEEVIL, *Pandeletetius hilaris*, Herbst. (Coleoptera. Curculionidæ.)

A smaller perforation than that of the preceding insect, containing a worm resembling that of the plum curculio, and which is the young of a weevil met with upon the leaves of the oak from May till the last of September, 0.20 long and of a pale brown color, its wing-covers on each side usually gray bordered above with black, and sending two gray branches obliquely inwards towards the suture, with very stout fore legs and a short broad beak having a furrow along the middle of its upper side; with its beak boring a hole in the bark and placing an egg therein. See Harris' Treatise, page 61.

297. SILKY TIMBER-BEETLE, *Lymexylon sericeum*, Harris. (Coleoptera. Lymexylonidæ.)

Boring small long cylindrical burrows in the wood of the oak, probably, and other trees; a slender odd-looking worm with six legs placed on its breast, a prominent hump upon its neck, and a leaf-like fleshy appendage at the end of its back; changing into a long narrow chestnut-brown beetle, 0.50 long, bearded with short, shining, yellowish hairs, giving it a silky lustre, its eyes large and almost meeting together above and below, and its wing-covers tapering and shorter than the body. See Harris' Treatise, p. 51.

298. AMERICAN TIMBER-BEETLE, *Hylecœtus Americanus*, Harris. (Coleoptera. Lymexylonidæ.)

A worm very similar to the preceding, but with a straight sharp-pointed horn at the end of its back in place of a leaf-like appendage; changing into a pale brownish-red beetle 0.40 long, its wing-covers, except at their base, and its breast black, its eyes small and a glassy dot on the middle of its forehead resembling a small eyelet. See Harris' Treatise, p. 51.

This and the preceding are very rare insects, and their larvæ have never been detected, but are inferred by Dr. Harris to inhabit oaks and to have the singular forms above indicated, from the analogy of the perfect insects to two European species. Foreign writers, I see, are misled by Dr. Harris's account, into supposing that it is authentically ascertained that our insects coincide in their larva state with the European species.

299. FEEBLE OAK-BORER, *Goes debilis*, Leconte. (Coleoptera. Cerambycidæ.)

A cylindrical long-horned beetle, which has recently been described by Dr. Le Conte, under the above name, is so uniformly found upon white oak trees in July and August, that I doubt not its larva is a borer in the trunks of these trees, perforating the wood, probably, in a manner similar to that of the marked pine borer. No. 230, and the worm resembling that in its appearance. This beetle is half an inch long and scarcely a third as broad, of a black color, its wing-covers chestnut red, its surface having a marbled appearance, produced by short prostrate hairs of a dull ochre yellow color, except on the anterior half of the wing-covers, where they are gray, and are here followed by a tawny brown spot destitute of these paler hairs. It has only been found, as yet, in the State of New York, in the northern sections of which it is not rare.

300. THUNDERBOLT, *Arhopalus fulminans*, Fabricius. (Coleoptera. Cerambycidæ.)

Excavating a burrow in the soft sap-wood, about three inches long and 0.20 in diameter, this burrow having the shape of a much bent bow or a letter U ; a worm similar to that of the apple-tree borer, which passes its pupa state in the same cell and produces a long-horned beetle which comes abroad the beginning of July, and is three times as long as broad, varying from a half to nearly three-fourths of an inch in length, of a black color, with transverse zigzag gray lines often broken into small spots on its wing-covers, and readily distinguished from all other species by its thorax, which is nearly globular and gray, with a large egg-shaped coal-black spot on the middle of its upper side.

301. WHITE-BANDED PHYMATODES, *Phymatodes albofasciatus*, new species. (Coleoptera. Cerambycidæ.)

A black long-horned beetle 0.25 in length or slightly less, and about a third as broad, somewhat flattened, clothed with fine erect gray hairs, its wing-covers with two distinct slender white bands which do not reach the suture, the anterior one more slender than the hind one and curved, the antennæ and slender portions of the legs usually chestnut colored.

Several specimens of this beetle were met with a few years since, the last of May, on the trunk of a black oak, in which, it is probable, their younger state had been passed. It is closely related to the black varieties of *P. varius* Fab., but is a third smaller, with the white bands much more slender, and the surface of the wing-covers are perceptibly more rough than in my specimens of that insect, notwithstanding their smaller size. Its thorax is densely punctured, with a short smooth stripe between the centre and the base. One of the specimens varies in having the posterior white band wholly wanting.

Several others of our long-horned beetles are usually found upon oaks, in the trunks or limbs of which the larvæ probably reside.

302. TOOTH-LEGGED BUPRESTIS, *Chrysobothris dentipes*, Germar. (Coleoptera. Buprestidæ.)

A slender, winding, serpent-shaped worm-track between the bark and wood of newly felled trees ; formed by a white footless grub, its anterior end enormously large, round and flattened ; sinking itself probably slightly into the wood to pass its pupa state ; producing a flattish oblong purplish-black beetle about 0.50 in length, coppery beneath, its face brassy and with two smooth raised dots, its thorax with two smooth raised stripes separated by an intervening groove; often found basking in the sunshine on the bark of the trees in June and July. See Harris's Treatise page 43.

The APPLE BUPRESTIS, No. 3, before apple trees were introduced upon this continent, was cradled in the oaks, and is still frequently found in them. It is also probable that others of the American species of this same genus, of which there are quite a number, whose preparatory state are yet unknown, are nurtured in the oaks.

The larvæ of the HORN-BUG, No. 6—very large, soft white grubs, with their bodies doubled together in the shape of the letter U, their tips, which are thick and of a livid bluish gray color as though discolored from being bruised, being held against their breasts—are quite common in the damp putrid wood in the centre of old trees and in their stumps, and also occur in the decaying sapwood. The larvæ also of the BIG-EYED SNAPPING BEETLE No. 9, and of several other beetles of smaller size than these, are found in the same situations.

303. QUERCITRON BARK BORER, *Graphisurus fasciatus*, Degeer. (Coleoptera. Cerambycidæ.)

Feeding upon and destroying the quercitron bark (the inner bark of the black oak, *Quercus tinctoria*,) of newly felled trees, forming large tracks therein which are filled with worm-dust, and in an oval cavity at the end of these tracks a white footless grub about 0.60 long and a fourth as broad, slightly tapering, and with a transverse oval tawny yellow spot on the middle of each ring above and below; changing to a pupa lying naked in the same cavity, and in June coming out, a long-horned beetle about 0.50 long and a third as broad, of an ash-gray color freckled with blackish spots and punctures, and back of the middle of its wing-covers an irregular oblique black band, the female with a tail-like ovipositor.

The black oak is most highly valued for its bark, the quercitron of commerce, yielding a bright yellow dye. The bark of the dead tree, it is said, is not at all inferior for coloring purposes, to that cut from living trees. But unless this bark is peeled immediately after the tree falls to the ground, it becomes very much worm-eaten and nearly worthless. The worms which burrow in and destroy it are produced by a long-horned beetle differing remarkably from all the other beetles of this group in that the female is furnished with a straight awl-like ovipositor nearly a quarter of an inch in length, projecting horizontally backwards from the end of her body. The importance of this implement becomes manifest when we observe the thickness of the bark of the black oak, with its outer layers so dry and hard that they form as it were a coat of mail, protecting the trunk of the tree against the attacks of its enemies. Equipped as she is, however, the female of this beetle is able to perforate this hard outer bark and sink her eggs through it, placing them where her young will find themselves surrounded with their appropriate food. The worms from these eggs mine their burrows mostly lengthwise of the grain or fibres of the bark, and the channels which they excavate are so numerous and so filled with worm-dust of the same color with the bark, that it is difficult to trace them. The eggs are deposited the latter part of June, and the worms grow to their full size by the close of the season, and will be found during the winter and spring, lying in the inner layers of the bark, in a small oval flattened cavity about an inch in length, which is usually at the larger end of the track they have travelled.

This LARVA is divided by transverse constrictions into twelve rings, the last one being double. The head is small and retracted more or less into the neck, its base white and shining, and its anterior part deep tawny yellow, and along each side black. The neck or first ring is much longer as well as thicker than any of the others, the two rings next to it being shortest. From the neck the body of the worm is slightly tapered backwards to the middle, from whence it has nearly the same diameter to the tip, where it is bluntly rounded. Upon the upper side of the neck, occupying the basal half of this ring, is a large transverse tawny yellow spot, rounded upon its forward side, but no corresponding spot appears on the under side of this ring. On the middle of all the other rings except the two last, both above and below, is an elevated, rough, transverse, oval spot, of a tawny yellow color.

The BEETLE, like other species of the family to which it pertains, varies greatly in its size, specimens before me being of all lengths, from 0.35 to 0.58. It is of an ash-gray color from short incumbent hairs or scales, which have a faint tinge of tawny yellow except along the suture of the wing-covers. It is also bearded with fine erect blackish hairs which arise from coarsish black punctures which are sprinkled over the thorax and wing-covers, several of which punctures are in the centre of small black dots, which in places are confluent into small irregular spots. The head is of the same width as the anterior end of the thorax, and has a deep narrow furrow along its middle its whole length, and on the crown is an oval blackish spot on each side of this furrow. The face is dark gray, and the antennæ are black with an ash-gray band occupying the basal half of each of the joints. The thorax is narrower than the wing-covers, more broad than long, and thickest across its middle. Upon each side slightly back of the middle is an angular projection or short broad spine, blunt at its tip. On the middle of the back between the centre and the base is a short impressed line, and on each side of this, extending the whole length of the thorax is a wavy blackish stripe, which is suddenly widened towards its hind end, and is sometimes interrupted in its middle. Often, also, there is a blackish spot between the anterior ends of these stripes, extending from the centre of the thorax to its forward end. The scutel is ash-gray in its middle and black upon each side. The wing-covers almost always show a large oblique and irregular triangular spot of black on their outer side forward of the middle, and always behind the middle is an irregular black oblique band, which seldom reaches to the suture, and which has a notch in the middle of its anterior side and opposite to this on its hind side a large angular projection extending backward. Immediately back of this band is an irregular spot of a paler black color, which is sometimes confluent with the band; and there is also a small blackish spot on the outer side of the tips. The tips are cut off, sometimes transversely in a straight line, but usually concavely, and sometimes presenting a slight tooth-like projection on each side. The legs are ash-gray, the thighs with two black spots on their upper side, and the shanks with a black band at their base and another at their tip, these bands being more broad on the hind pair.

On elevating the loose bark of fallen trees the fore part of June, these insects will be found therein, lying in the cavities already mentioned, some of them being still in their pupa state, whilst others are changed to their perfect form, ready with the stout jaws and sharp teeth with which they are furnished, to gnaw their way through the bark and come abroad.

This species occurs throughout the United States and Canada. Different specimens of it, however, vary greatly in their aspect. Even when newly

UofM

born, among the individuals in the bark of the same tree, considerable diversities in size and markings may be noticed. And the beetles found in this situation have their colors so much brighter and their spots and bands so much more distinct and clearly defined, that I supposed them to be a different species from *fasciatus* for several years, and until specimens came to hand showing a gradual transition from these to the older individuals which we usually capture abroad, and meet with preserved in cabinets, in which the colors have become faded and dim and the marks obscure and partially obliterated. In the shape of some of its parts, also, different specimens are liable to vary. And I cannot persuade myself that the species named *pusillus* by Kirby is really distinct from the one under consideration. Dr. Le Conte supposes it may be distinguished by its smaller size, and by the spine on each side of its thorax being smaller and perfectly straight on its hind side, instead of concave. But in the smallest specimen in my collection, measuring but 0.35, this spine is about as prominent as in any of the larger ones, and its hind margin is straight, as it is also in several other examples, one of which is 0.58 in length. This form of the spine, therefore, is not peculiar to the smaller sized specimens. Moreover, in one instance before me, this margin is wavy instead of straight, and in several others it is straight nearly to its outer end, where it suddenly curves outward by reason of the tip of the spine being slightly prolonged or attenuated; whilst in other cases still, this margin is regularly concave or curved through its whole length. We thus, in different specimens, meet with a regular gradation from the straight margined spines of *pusillus* to the concave of *faciatus*, as these species are distinguished by Dr. Le Conte; showing that no such difference as has been supposed, really exists in nature. And we therefore regard the *pusillus* of Kirby as being merely a dwarf variety of this species.

304. Oak Leiopus, *Leiopus Querci*, new species. (Coleoptera. Cerambycidæ.)

A very small long-horned beetle, which I am unable to refer to any of the described species, I am assured lives at the expense of the red and white oak, from meeting with it upon those trees standing apart from others in fields. As the larvæ of kindred species burrow in the bark of trees, this will probably be found in the same situation in oaks. The beetle is met with upon the leaves of these trees early in July. It is very closely related to the Facetious Leiopus, No. 286.

It is 0.20 long, and black with ash-gray wing-covers, which are punctured and marked with a large black spot on the base of their suture in the form of a cross, and a broad black band slightly back of their middle, which is angulated, somewhat resembling an inverted letter W, this band often having a small ash-gray spot placed in it near its outer ends. Forward of this band are two black dots or short lines on each wing-cover, and sometimes a third dot back of it. There is also a dusky spot, usually, on the tips of the wing-covers, and their deflected outer margin is black. The wing-covers are rounded at their tips. The thorax sometimes shows three faint gray stripes above. It is narrowed anteriorly, and on each side slightly forward of the base is a short, broad, sharp-pointed spine, from the tip of which, for-

ward, the sides are straight. The long thread-like antennæ are dull yellow, with a slight duskiness at the end of each joint. The legs are blackish with the bases of the thighs, and frequently of the shanks also, pale dull yellow, the hind thighs being less thickened towards their tips than the four forward ones.

AFFECTING THE LIMBS AND TWIGS.

305. Oak pruner, *Elaphidion putator*, Peck. (Coleoptera. Cerambycidæ.)

[See Report Third, plate 2, fig. 2.]

The limbs towards their ends cut smoothly off, transversely, the latter part of summer, and found through the autumn and winter lying on the ground beneath the trees with their withered leaves adhering to them; a hole bored in their severed end, and extending up their center, in which lies a white footless worm, over a half inch long and a fourth as broad, slightly tapering and divided into twelve rings by very broad deep constrictions; changing to a somewhat active pupa within the limb, from which in June comes a slender cylindrical long-horned beetle half an inch long, of a dull black color with brownish wing-covers which have two sharp points at their tips and ash-gray hairs forming small spots here and there, its thorax with coarse close punctures and its under side and legs chestnut colored.

The singular habit of this insect of severing the limb in which it is cradled and dropping itself herein to the ground, varying its operations to accord with the size and nature of the limb, renders it one of the most interesting native species of our country. Its biography has never yet been written, that I am aware, except very imperfectly. The leading facts in its life were first made known in the year 1819, by Prof. Peck, in an article published in the Massachusetts Agricultural Repository, vol. v. pp. 307—311, accompanied with a plate; and some slight additions are made thereto, by Dr. Harris, in his Treatise, p. 86.

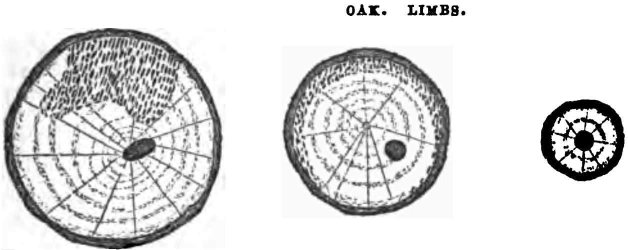
The purpose for which this insect cuts off the limb, is probably as Prof. Peck, suggests; as the worm is to remain in the limb through the winter, it appears to forsee that, from being wounded as it is, it will perish and become too dry if it remains elevated in the air; it therefore drops it to the earth, where, lying among the fallen leaves and buried beneath the winter's snows, it remains moist and adapted for the development of the insect within it.

The severed limbs are usually but eighteen inches or two feet in length, but Prof. Peck states that limbs an inch in thickness and five feet in length are sometimes found. I have seen a limb cut off by this insect, which was ten feet in length and an inch and a tenth in thickness, and have repeatedly met with them seven and eight feet long, and usually an inch, but in one instance an inch and a quarter in thickness.

The parent beetle seems aware that her progeny, in their infancy, will be too feeble to masticate the hard woody fibres of the limb. She therefore selects one of the small twigs which branch off from it, which is not thicker than a goose quill, with its base composed of soft wood, the growth of the last year, all the remainder of the twig being the green succulent growth of the present year. She places her egg near the tip of this twig, in the angle where one of the leaf-stalks branch off from it. The young worm which hatches therefrom sinks himself into the center of the twig and feeds upon the soft pulpy tissue around him until it is all consumed, leaving only the green outer bark, which is so thin and tender that it withers and dries up, and ere long becomes broken. By the time this green tender end of the twig is consumed the worm has acquired sufficient size and strength to attack the more solid woody portion forming its lower end. He accordingly eats his way downward in the centre of the twig, consuming the pith, to its base, and onward into the main limb from which this twig grows, extending his burrow obliquely downward to the center of the limb, to a distance of half an inch or an inch below the point where the lateral twig is given off.

The worm being about half grown, is now ready to cut the limb asunder. But this is a most nice and critical operation, requiring much skill and calculation; for the limb must not break and fall whilst he is in the act of gnawing it apart, or he will be crushed by being at the point where it bends and tears asunder, or will fall from the cavity there when it breaks open and separates. To avoid such casualities, therefore, he must after severing it, have time to withdraw himself back into his hole in the limb and plug the opening behind him, before the limb breaks and falls. And this little creature accordingly appears to be so much of a philosopher as to understand the force of the winds and their action upon the limbs of the tree, so that he can bring them into his service. He accordingly severs the limb so far that it will remain in its position until a strong gust of wind strikes it, whereupon it will break off and fall.

But the most astonishing part of this feat remains to be noticed. The limb which he cuts off is sometimes only a foot in length and is, consequently quite light; sometimes ten feet long, loaded with leaves, and very heavy. A man by carefully inspecting the length of the limb, the size of its branches, and the amount of foliage growing upon them, could judge how far it should be severed to insure its being afterwards broken by the winds. But this worm is imprisoned in a dark cell only an inch or two long, in the interior of the limb. How is it possible for this creature, therefore, to know the length and weight of the limb, and how far it should be cut asunder? A man, moreover, on cutting a number of limbs of different lengths, so far that they will be broken by the winds, will find that he has often miscalculated, and that several of the limbs do not break off as he designed they should. This little worm, however, never makes a mistake of this kind. If the limb be short, it severs all the woody fibres, leaving it hanging only by the outer bark. If it be longer, a few of the woody fibres on its upper side are left uncut in addition to the bark. If it be very long and heavy, not more than three-fourths of the wood will be severed. The annexed figures represent the severed ends of limbs of different



Ends of oak limbs as cut off by the Oak pruner—designed to show that where the limb is small it cuts it all off except the outer bark; when the limb is larger, it leaves a ring of wood on one side, in addition to the bark; and when very large it leaves a large piece of wood unsevered—showing also the hole out of which the worm comes.

sizes, the coarsely dotted parts of the two first indicating the ragged broken ends of the woody fibres, the remainder being the smooth surface cut by the worms, and the large black dot representing the perforation leading up the limb to where the worm lies. The first of these figures was taken from the limb already spoken of as ten feet in length, and here it will be noticed that a portion of the stouter wood towards the center of the limb was preserved, as though the worm had been aware that the weaker sappy fibres outside, next to the bark, could not be relied upon for sustaining a limb of this size, as they are where the limb is smaller. With such consumate skill and seemingly super-terrestrial intelligence does this philosophical little carpenter vary his proceedings to meet the circumstances of his situation in each particular case! But by tracing the next stage of his life we shall be able to see how it is that he probably performs these feats which appear so much beyond his sphere.

Having cut the limb asunder so far that he supposes it will break with the next wind which arises, the worm withdraws himself into his burrow, and that he may not be stunned and drop therefrom should the limb strike the earth with violence when it falls, he closes the opening behind him by inserting therein a wad formed of elastic fibres of wood. He now feeds at his leasure upon the pith of the main limb, hereby extending his burrow up this limb six or twelve inches or more, until he attains his full growth—quietly awaiting the fall of the limb, and his descent therein to the ground. It is quite probable that he does not always sever the limb sufficiently in the first instance, for it to break and fall. Having cut it so much as he deems prudent, he withdraws and commences feeding upon the pith of the limb above the place where it is partially severed, until a high wind occurs. If the limb is not hereby broken, as soon as the weather becomes calm he very probably returns and gnaws off an additional portion of the wood, repeating this act again and again, it may be, until a wind comes which accomplishes the desired result. And this serves to explain to us why it is that the worm severs the limbs at such an early period of his life. For the formidable undertaking of cutting asunder such an extent of hard woody substance, we should expect he would await till he was almost grown and had attained his full strength and vigor. But by entering upon this task when he is but half grown he has ample opportunity to watch the result, and to return and perfect the work if he discovers his first essay fails to accomplish the end he has in view.

Thus the first part of the life of this worm is passed in a small twig branching off from the main limb. This is so slender and delicate that on being mined as it is by the worm and all its green outer end consumed, it dies and becomes so decayed and brittle that it is usually broken off when the limb falls, whereby it has escaped the notice of writers, hitherto. The remainder of his larva life is passed in the main limb, first cutting off this limb sufficiently for it to break with the force of the winds, and then excavating a burrow upwards in the center of the limb, both before and after it has fallen to the ground, feeding hereon until he has grown to his full size.

It is most frequently the limbs of the red and the black oak that I have met with, severed by the Oak pruner, though it is not rare to find those of the scarlet oak (*Q. coccinea*) and of the white oak lopped off in the same manner. Limbs of the beech and chestnut not unfrequently, and those of the birch, the apple, and probably of other trees, are sometimes similarly severed. Mr. P. Weter, of Tirade, Walworth county, Wisconsin, informs me that the peach in his vicinity, suffers in a similar manner, and to such an extent some years, that the severed limbs, varying from a few inches to two feet in length, are seen lying under almost every tree. We have in our country several species of beetles very closely related to the Oak pruner, but no attempts have yet been made to ascertain their mode of life. It is very probable that they all have this same habit of cutting off the limbs of trees, one perhaps preferring the wood of one kind of tree, another, another. This is the more probable, since there is considerable diversity in their operations, as shown by an examination of the fallen limbs. Thus the scarlet oak, instead of having a hole bored in the severed end of its limbs, commonly has half the wood ate away on one side of the limb for the length of an inch or more, with the cavity thus formed under the bark packed with worm dust, and a cylindrical burrow from the upper end of this cavity running upwards in the centre of the limb, the same as in other cases.

It further appears that the female, when ready to drop an egg, is not always able to find a small twig with a green succulent end adapted to her wants. She then consigns her progeny to the bark of the main limb, and the young worm subsists on the soft pulpy matter between the bark and the wood, excavating a shallow irregular cavity which is packed with worm dust, till it has acquired sufficient strength to gnaw the wood, when it cuts off the limb as in other cases. It may, however, be a different species from the common Oak pruner, which cradles its young thus beneath the bark instead of in a lateral twig. It is usually in the fallen limbs of the beech, though sometimes in those of the oaks also, that I have met with these worm tracks under the bark.

The bark of the beech, it will be recollected, is quite thin and very brittle, so that it will illy serve to hold the limb in its place if the wood underneath is cut off in the usual manner. And accordingly a remarkable modification of this operation will be noticed in the amputated limbs of this tree. The worm eats its way down the limb beneath the bark until it has acquired sufficient strength to sever the woody fibres. It then passes transversely around the limb beneath the bark, girdling it by cutting off all the softer outer fibers and leaving the harder ones in the middle of the limb uncut, whereby the limb is sustained until the wind strikes it. How surprising that these little creatures have such intelligence given them as enables them to vary their operations to such an extent, according to the circumstances of their situation in each particular case! I should be inclined to think the beech pruner a different species from that of the oak, as it dwells beneath the bark instead of in a lateral twig, and cuts off the outer instead of the inner wood of the limb; but the worm is identical with that of the oak in its external appearance, and one of these worms which I placed in a cage, falling from its fractured burrow in the beech limb, forsook this wood and commenced boring into an oak limb lying beside it.

Not only the limbs but small young trees, at least of the white oak, are sometimes felled by these insects; in which cases the worm, instead of cutting the wood off transversely, severs it in a slanting or oblique direction, as though it were aware the winds would prostrate a perpendicular shoot more readily by its being cut in this manner.

The LARVA grows to a length of 0.60, and is then 0.15 thick across its neck, where it is broadest. It tapers slightly from its neck backwards, the hind part of its body being nearly cylindrical. Is is a soft or fleshy grub, somewhat shining and of a white color, often slightly tinged with yellow, its head, which is small and retracted into the neck, being black in front. It is divided into twelve rings by very deep, wide, transverse grooves. The neck or first ring is much the largest, and shows two very pale tawny yellow bands on its upper side, the anterior one slightly broken asunder in its middle, and on each side beyond the ends of these bands is a spot of the same color. The two or three rings next to the neck are shorter than the others, and less widely separated from each other. A faint stripe of a darker color may be discerned along the middle of the back, widely broken apart at each of the sutures. The last ring is much narrower and more shining than the others, and is cut across by a fine transverse line, dividing it into two parts, of which the hinder one or tip is bearded with small blackish hairs, and a few fine hairs are perceptible upon the other rings. The two last rings are retracted into the ring which precedes them, at the pleasure of the animal, whereby this ring becomes humped and swollen; and it appears to be chiefly by thus enlarging the end of its body that the worm holds and moves itself about in its cell, its feet being so weak and minute that they are scarcely perceptible and can be of little service. It has three pairs of soft conical jointed feet, resembling its antennæ in their size and shape. The first pair is placed on an elevated wrinkle of the skin in the suture between the first and second segments of the thorax, more distant from each other than are those of the second and third pairs, which are situated on the middle of the elevation of the second and third segments.

Some of the worms enter their pupa state the last of autumn, and others not till the following spring. Hence in examining the fallen limbs in the winter, a larva may be found in one, a pupa in another. Preparatory to entering its pupa state, the larva places a small wad of woody fibres, sometimes intermingled with worm-dust, below it, in its burrow, and sometimes another wad above it if the burrow runs far up the limb, thus partitioning off a room one or two inches in length in which to lie during its pupa state. The shrivelled cast skin of the larva will be found at the upper end of this cell, after it has changed to a pupa.

Usually those insects which undergo a complete metamorphosis, remain at rest, lying dormant and motionless during their pupa state. The Oak pruner, however, is a remarkable exception to this. Whenever its cell is opened it will be seen moving from one end of it to the other with quite as much agility as it shows in its larva state. The sutures of its abdomen have the same deep transverse grooves as in the larvæ, admitting the same amount of motion to this part of its body that it previously had. And lying on its back, it uses the tip of its abdomen as though it were furnished with a pro-leg, the little sharp points with which it is covered being pressed against the rough walls of the cell, and the body pushed forward or drawn backward hereby, step after step, at the will of the animal.

The PUPA is of much the same size with the larva and of a yellowish white color. Its eyes are sometimes white, sometimes blackish brown. The antennæ-sheaths arise in the notch upon the inner side of the eyes and passing directly across the surface of these organs, extend down along each side of the back above the sheaths of the fore and middle pairs of legs, then curving inward they pass back to the eye along the inner side of the same legs, their ends being placed upon the eye slightly inside of their origin. The knees of the hind legs protrude far out from under the upper sides of the wing-sheaths forward of their tips, whilst the feet of these legs occupy the space between the tips of the wing-sheaths. The back of the abdomen shows a distinct pale brown stripe along the middle, on each side of which the surface of the segments is furnished with numerous small erect sharp points of a dark brown color, those on the apical segment being double the length of the others.

Prof. Peck bestowed upon this insect the name *Stenocorus putator*, the latter epithet meaning a pruner or vine-dresser, and he characterizes the beetle thus named, as varying in length from 0.45 to 0.60, the largest individuals being but 0.12 in thickness, and being of a dull or obscure brown color with white hairs, its thorax without spines, its wing-covers two-toothed at their tips, and its antennæ of the length of the body, the two joints next to the base with a small spine at their tips. Dr. Harris adds to this that the surface is sprinkled with gray spots composed of very short close hairs and the scutel is yellowish white. These characters, however, will include what at present stand in the books as several distinct species. I would therefore observe that the specimens which I have obtained from the severed oak limbs of this vicinity and which I therefore regard with confidence as being the true *putator* of Prof. Peck, present the following characters. They are usually from 0.50 to 0.55 in length and 0.12 broad, of a slender cylindrical form, of a dull black color, tinged more or less with brown on the wing covers, more evidently so towards their tips, whilst the antennæ are paler brown, and the under side and legs chestnut colored, sometimes bright, sometimes dark and blackish. The surface is everywhere clothed with shortish prostrate gray hairs, and on the wing-covers these are in places more dense, forming small gray spots, and on each side of the thorax, in the middle, is a whitish dot, formed in the same manner. Sometimes also on the base of the thorax, on each side of its middle, a short gray stripe formed by these hairs, is very obvious, whilst in other individuals no traces of these stripes can be discerned.

The scutel also is densely covered and gray from these hairs. The surface, above, is occupied by numerous coarse round punctures, those on the thorax being of the same size with those on the wing-covers, but more crowded, many of them running into each other. Towards the tips of the wing-covers these punctures become perceptibly smaller. Among the punctures of the thorax, slightly back of its center, a smooth shining callous-like spot or short line may be discerned; and sometimes, forward of this, on each side of the middle a small dot, smooth and shining, is very distinct, such specimens appearing to constitute the species named *rusticum* by Dr. Le Conte. In some specimens, also, on the wing covers, sometimes one, more often two, slightly elevated, smooth longitudinal lines are very manifest, these appearing to be the *oblitum* of the same author. What I regard as the females of this species, although as yet I have bred no specimens of this kind from oak limbs, differ from the preceding in being of a slightly broader and more robust aspect, with the back more flattened, and the wing covers of a lighter brown color, and sometimes as pale as the antennæ. And in these no smooth callous-like spot back of the center of the thorax is to be perceived, in the few specimens which I at present have in my hands.

Although Prof. Peck and Dr. Harris regard this insect as different from any thing described by Fabricius, our latest authorities place it as a synonym of the *Stenocorus villosus* of this author. There, however, is nothing in the original description of the species thus named, to indicate it as being this more than any one of a half dozen other insects of our country. The *villosus* is merely said to be a slender medium-sized Carolina species of a dull or dusky color, slightly clad with ash-gray down, its thorax unarmed and its wing covers two-toothed. We find nothing in this description whereby it can be decided to which particular one of several species it refers. And if the name *villosus* ought not to be wholly rejected in consequence of this uncertainty, I am disposed to regard it as belonging to a southern species, the same, I suppose, which Dr. Le Conte places under this name, which is larger in size, and with the punctures of its thorax much more fine dense and confused than in our Oak pruner.

This insect is co-generic with a West India species named by Fabricius *Stenocorus irroratus*, for specimens of which and many other interesting species from the same locality, I am indebted to F. J. Barnard, Esq., of Albany. In the year 1833 M. Serville proposed a new genus, named *Elaphidion* (Ann. Soc. Ent. France, ii., 540) for the reception of this species. From the remarks of Rev. F. W. Hope in Trans. London Zool. Soc., iii., 187, it might be inferred that a genus named *Cycliopleurus*, founded by him upon this same West India species, had been published in the Proceedings of said Society, May, 1833, a few months anterior to Serville. But though an abstract of Mr. Hope's paper was given in the place referred to, this genus is not noticed therein, and did not appear in print till the first volume of the Transactions of the Society was published, two years later. *Elaphidion*, therefore, appears to be the legitimate name of the genus to which our Oak pruner pertains.

In at least three-fourths of the fallen limbs no worm is to be found; and an examination of them shows that the insect perished at the time the limb was severed, and before it had excavated any burrow upward in its center, no perforation being present except that leading into the lateral twig. It is probable that in many of these instances the limb broke when the worm was in the act of gnawing it asunder, either from its own weight or from a wind arising whilst the work was in progress. And even though the worm may have withdrawn into its hole and plugged the opening behind it, it is frequently discovered here, probably, and devoured by birds. After a violent wind in the summer season, some of our insect-eating birds may always be noticed actively in search of limbs and trees that have thereby been broken, their instinct teaching them that this breakage usually occurs from the wood being weakened by the mining operations of worms therein, whose lurking places are now opened to them. And they will be seen industriously occupied in picking around the fractured ends of the wood, and feasting upon the grubs which they there find. Numbers of our wood-boring larvæ are thus destroyed, and the Oak pruner, notwithstanding the precautions it takes to secrete itself, doubtless frequently falls a prey to these sagacious foragers.

These insects will undoubtedly at times occur in such numbers as to render it important that they be destroyed, at least where they resort to the peach or other valuable trees. And this may readily be effected by gathering and burning the fallen limbs in the winter or the early part of spring.

The SINGLE STRIPED TREE HOPPER, No. 102, is common upon oak limbs, puncturing them and sucking their juices.

306. OAK BLIGHT, *Eriosoma Querci*, new species. (Homoptera. Aphidæ.)

A species of blight, or a wooly aphis upon oak limbs, puncturing them and exhausting them of their sap, was met with in northern Illinois, but I have never seen it in New York. It is very like a similar insect upon the bass-wood. The winged individuals are black throughout, and slightly dusted over with an ash-gray powder resembling mold. The fore wings are clear and glassy, with their stigma-spot dusky and feebly transparent, their rib-vein black, and their third oblique vein abortive nearly or quite to the fork. It is 0.16 long to the tips of its wings. I find no wooly aphis mentioned by European authors as infesting the oak, except the *Eriosoma Quercus* of Sir Oswald Mosley (Gardener's Chronicle, i. 828), which, in the List of Homopterous insects of the British Museum, p. 1083, is supposed to be the *Coccus lanatus* of Geoffroy, and would hence appear to be a very different insect from the one now described.

OAK. LIMBS.

307. WHITE OAK SCALE INSECT, *Lecanium Quercifex*, new species. (Homoptera. Coccidæ.)

Adhering to the smooth bark on the under side of the limbs of the white oak, in June, an oval, convex, brownish black scale about 0.30 long and 0.18 wide, its margin paler and dull yellowish, from which come myriads of lice so minute as to be scarcely perceptible to the eye, and which distribute themselves over the surrounding bark, sucking its juices.

I am unable to refer to any description of the European scale insect of the oak, *L. Quercus*, Linn., but as Geoffroy terms that species the Kidney-shaped oak scale (*Quercus reniformis*) I am led to conclude it is different from the regularly rounded-oval scale of the oaks in this country.

308. QUERCITRON OAK SCALE INSECT, *Lecanium Quercitronis*, new species.

On the small limbs of the black oak, a similar scale to the preceding, but smaller and of a nearly hemispherical form, its color varying from brownish black to dull reddish and pale dull yellow, with a more or less distinct stripe of paler yellow along the middle of its back, and the paler individuals usually mottled with black spots or stripes. Length of the larger scales about 0.20, width 0.16.

These scales, the reader will be aware, are the relics of the female, covering and protecting her eggs. Interspersed with them are usually seen other scales and smaller, only 0.10 in length, and of an elliptic form and a glossy black color with a wide margin of pale yellow, which margin has a plaited appearance from fine raised radiating lines. These smaller scales are the pupæ of the males, a small winged fly coming from each of them, whereas the females never acquire wings.

Often a round hole will be noticed in these smaller scales, perforating them near one end. This hole is gnawed by a minute parasite, which has fed internally on the insect and completed its transformations beneath the scale. Of five of these pupæ scales which were gathered on the first day of June, one was found to be already perforated. From another the parasite came out five days afterwards, and a second specimen made its exit from another of the scales five days later. This same parasite also destroys the male pupæ of some of the other species of this genus. It pertains to the family PROCTOTRUPIDÆ, and appears to belong to the genus *Platygaster*. It may be named *P. Lecanii*, or the Scale insect parasite. It is quite small, measuring 0.035, and to the tip of its wings 0.05. It is shining black, with its scutel pale yellow and appearing like a large crescent-shaped spot of this color placed crosswise upon the hind part of its thorax. Its legs are white with the thighs black except at their opposite ends. Its abdomen is slightly smaller than the thorax and shaped like the bowl of a spoon, being deeply hollowed on the back and convex beneath. Its antennæ are thread-like with the joints cylindrical and three times as long as thick, the last one not enlarged. Its wings are clear and glassy, strongly reflecting the colors of the rainbow. They are wholly destitute of veins, except a rib-vein running parallel with the outer margin the first half of its length and then uniting with the margin to beyond the middle, where it is slightly incurved and ends in an irregular triangular knob.

309. OAK-TUMOR GALL-FLY, *Cynips Quercus-tuber,* new species. (Hymenoptera. Cynipidæ.)

On or near the ends of the small limbs and twigs of the white oak, hard irregular swellings thrice as thick as the twig below them, the bark upon them of a brighter cherry red color than elsewhere, and their substance internally corky and woody; produced by the stings of a small black gall-fly with dull pale yellow antennæ, mouth and legs, its hind shanks and its antennæ towards their tips being dusky, its length 0.08 and to the tips of its wings 0.13.

These tumors or galls are quite common, particularly upon the soft and tender limbs of small young trees. Two distinct varieties in their form will be observed as they grow at the ends of the limbs, or lower down upon their sides. Those upon or near the tips of the limbs are shorter *rounded galls,* little longer than broad, and usually of a deeper red color and a more irregular uneven surface. They are about a half inch in length and a fourth less in thickness. Those growing along the side of the stem are longer *elliptic galls* of about the same width as the preceding, but twice or three times as long, and of a paler though still a deep cherry red color. The whole circumference of the limb is involved in this diseased swelling, except a narrow stripe along its hind side where the bark retains its natural striated appearance. When fully grown the surface of both kinds of these galls becomes glaucous white, as though thinly coated with moldiness. Sometimes two, three or more of these tumors occur on the same limb, placed irregularly one below the other, or running partially into each other. A single one, however, always suffices to kill the limb at and above the point where it is situated, thus arresting its onward growth until one of the lateral shoots below grows to become a leading shoot in place of the one thus destroyed.

On cutting into these galls the small limb on which they grow is found to have its wood thickened or swollen, and over it, forming the chief bulk of the tumor, is a corky substance of a yellowish brown or snuff color, between which and the wood are several small hard grains resembling seeds, each having a cavity in its center, in which, doubled together, lies a soft white footless worm or maggot. This, on completing its growth, changes to a pupa in the same cell, and subsequently to a fly like its parent above described; whereupon, to escape from its confinement, it gnaws out of this hard seed-like envelope and onward through the corky substance and the external bark, thus producing those small perforations like pin-holes, which are always seen in these tumors after the insects have made their exit therefrom.

As several kinds of galls and gall insects are to be noticed in this part of my Report, some general remarks respecting them should here be introduced for popular information.

The term "gall" is currently understood, and is quite common as a proverbial word in our community, as implying a substance of an extremely bitter taste; and this originally was the true and sole signification of this word. Several of these vegetable excrescences being intensely bitter, they hence came to be called galls and gall-nuts. And thus this term was extended to other similar substances, though destitute of this property, and has now in different languages become the technical designation for all kinds of vegetable swellings, excrescences, and other unnatural growths which are produced by the stings of insects, whether they possess any bitterness or not. Even the knot-like swellings which are formed in the stalks of wheat by the Hessian fly and the Joint worm are true galls in the modern sense of this term. And the insects producing such swellings are called gall-flies. Nearly all of these insects pertain to two families, those which have four wings, like the one now under consideration, constituting the *Cynips* family in the order HYMENOPTERA, and those with two wings forming the *Cecidomyia* group in the order DIPTERA. But as the insects of these two groups have no resemblance to each other, and correspond only in the one particular of producing excrescences by their stings, the latter are more correctly and definitely termed gall-midges, and it is the members of the *Cynips* family only to which the name gall-flies truly belongs.

From differences in their form and in the number of joints in their antennæ, the gall-flies are divided into several genera. Of these genera that which retains the name *Cynips* is much the most numerous in its species. They are mostly very small insects resembling bees or ants of a short thick form, but with their antennæ straight instead of elbowed, and with none of that activity in their movements which belong to the insects named. They are mostly of a coal black color, with pale legs and antennæ, several of the species differing from each other only very slightly in size and in the hue of some particular part, being known with more certainty from the different galls from which they come than from the characters which the flies themselves present. In the several species here noticed, and ranked in the genus *Cynips*, five small longitudinal furrows may be seen on the thorax. Their scutel is rounded and protuberant, with a rough granular surface. Their abdomen is highly polished and shining, in the females compressed and shaped like a lens, its outline being nearly round when viewed in profile, with its hind end usually more or less truncated or cut off in a straight line perpendicularly, with a projecting valve at its lower end, and above this the end of the sting protruding obliquely upward. It is equal in its size to the thorax, but is smaller in the males, and without the projecting sting. The wings are transparent and colorless, the forward pair with three longitudinal veins and two transverse or oblique veinlets. The inner and middle longitudinal veins are abortive, being marked merely by very fine colorless lines, scarcely perceptible in the smaller species, and in strong contrast with the other vein and the veinlets, which are coarse, often dark colored, and very distinct. The middle longitudinal vein arises from the middle of the anterior veinlet, but is often obliterated at its commencement. It is widely forked, slightly before it reaches the second veinlet sending off a straight and very coarse branch to the outer margin. By the inner end of the second veinlet crossing this fork slightly back of its commencement a small triangular cell is formed in the center of the wing. Westwood, in defining this genus, says this small cell is bounded by veins of equal thickness; but in all the American gall-flies known to me the veins on one or both the anterior sides of this cell are much more slender than the one on its posterior side. Finally, the antennæ are thread-like, or of the same thickness through their entire length, and are about half the length of the body. Their joints are separated by very slight constrictions, whereby they are counted with difficulty by the aid of a common magnifying glass; but this instrument is sufficient to show their number, even in the smaller species. Westwood states the number of joints to be fourteen in the females and one more in the males. Hartig differs with him as to the latter. Brulle (Hymenopt. iv. 635) merely cites these authors without affirming anything on this subject himself. Had he no specimens at hand whereby to determine a point which appears so simple? Doubtless he had, and on examining them found he was unable to decide this matter. For, though the number of these joints appears to be constant in the same species, they differ in different species. Thus, in the gall-flies of the oak here described, of six species of which I possess examples of both the sexes, I find the number of joints to be as stated by Mr. Westwood in three only. In two of the others the females have but thirteen joints. Whilst in the remaining species, which is the Oak-tumor gall-fly now under consideration, the antennæ of the males have only fourteen and those of the females twelve joints. And in a seventh species, only the females of which are known to me, the number of these joints amounts to fifteen. It hence appears that the antennæ of these insects have sometimes one sometimes two more joints in the males than in the opposite sex, and that in the latter the number is from twelve to fifteen in different species.

In all parts of the world the oaks are far more infested with gall-flies than trees of any other kind. The naturalist Bosc during his residence in Carolina observed sixteen different kinds of galls, of which eight grew upon oaks; but all his endeavors to rear the flies from them were futile. My own efforts have been more successful, as will be seen by the accompanying notices. And a number of oak-galls, in addition to those herewith presented, are known to me, from which I have not yet been able to obtain the flies, from some of them parasites having come in their stead. I regret that I am unable to refer to the memoir of Bosc on the insects of this family, long since published in the second volume of the Paris Journal of Natural History, and also the Monograph of Brischke, which appeared a few years since at Berlin. Hence I may perchance here be giving as new, some species which have already been named in this latter work.

OAK. LIMBS.

Linnæus, in this group of insects, set us the example of bestowing names which express not merely the kind of tree but the particular part thereof, or the appearance of the gall from which the respective species are produced (*Cynips Quercus baccarum*, Oak berry gall-fly, *C. Quercus ramuli*, Oak twigs, *etc.*), and though such compound names are to be avoided as being inconveniently long, a departure from the general rule may well be permitted in this family, since hereby the names alone, in most instances, definitely indicate the species to which they refer, and these names also serve to diversify and relieve the science somewhat from that wearisome sameness and uniformity which pervades its nomenclature.

Where any of these insects attack a valued tree which it is desired to preserve from their depredations, the remedy is obvious and simple. Before the galls which they produce are so far matured that the inclosed insects have perforated and escaped from them, they should be cut from the tree and burned. Fortunately, it is only small young trees that gall-flies are liable to destroy or greatly injure by their attacks. And their parasitic and other enemies restrain them from multiplying so that it is seldom they will require any interference from man.

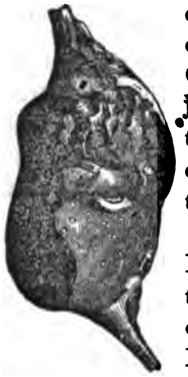
310. OAK-TREE GALL-FLY, *Cynips Quercus-arbos*, new species.

Swellings similar to those above described, growing on the tips of the limbs of aged and large white oak trees; producing a small black gall-fly having all its legs and antennæ of a bright pale yellow color, and one more joint in the latter organs than in the preceding species in the males, which sex is 0.06 in length, and to the tips of its wings 0.10.

I have in repeated instances observed these swellings at the tips of the lofty limbs of mature and aged oaks, when the trees were felled and their limbs thus brought within view. But having until this moment supposed these galls the same with the preceding species, I have taken no care to obtain the flies from them.

The fact has heretofore been stated that where trees are standing apart, for furnishing a shade in pastures and other cleared lands, or as ornamental trees in parks and pleasure-grounds, they gather more insects and are hence more stinted and deformed in their growth, than when they are associated together in forests. A large solitary oak which formerly stood in prominent view from the door of my dwelling was noticed for many years as making no perceptible advance in height or in the size of its body and limbs, although apparently healthy and clothed luxuriantly each summer with foliage. One morning in March this tree was observed cut down, and on repairing to it, it was discovered that the extreme ends of all the more vigorous and thrifty limbs and twigs were swollen into knobs or galls, wherefrom these ends would perish and their onward growth be thus arrested, all the other more puny limbs showing on their ends dead and decaying knobs of the same kind, which had grown in preceding years. Thus it was evidently this small gall-fly, which, by killing the ends of all the most vigorous and thrifty shoots, year after year, had been retarding the further growth of this majestic tree. The galls were at that time perforated with pin-holes, shewing that the fly had come from them the preceding autumn. On a careful search, however, two were found with the insect still in them. These were placed in a glass jar, and a single male fly was obtained from them, which I now discover to be unlike the foregoing species. I hence infer this to infest mature and aged trees, whilst all my specimens of that were reared from the more accessible galls growing on the tender juicy branches of young shoots and saplings.

311. Oak-potato gall-fly, *Cynips Quercus-batatus*, new species.



A large, hard, uneven swelling, three-fourths of an inch thick and twice or thrice as long, resembling a potato in its shape, growing on white oak twigs more distant from their ends than the Oak-tumor; producing a small black gall-fly with the basal joints of its antennæ and its legs dull pale yellow, its thighs and hind shanks black and its middle shanks often dusky, the antennæ in the female with thirteen joints, and the length of this sex 0.09.

This gall might be mistaken for a large example of the Elliptic variety of the one first described, but at each end the swelling arises much more abruptly from the limb, and on all sides of it, whereby the limb is wholly obliterated. Its surface is coated with a glaucous pale blue bloom. Internally it is of a dense corky texture in which are hard woody spots. And the fly which comes from it is readily distinguished from the Oak-tumor fly by the black color of its thighs.

312, 313. Oak-bullet gall-flies. *Callaspidia Quercus-globulus*, new species, and *Cynips oneratus*, Harris.

Smooth globular galls the size of a bullet, growing singly or two, three or more in a cluster, upon white oak twigs, internally of a corky texture, each containing in its center a single worm lying in a oval whitish shell resembling a little egg 0.15 in length; producing sometimes a black gall-fly with tawny-red legs and the second veinlet of its wings elbowed or angularly bent backwards, its length 0.15; sometimes a smaller fly (*C. oneratus*) of a clean pale yellow color, almost white, with a broad black stripe the whole length of its back, which color in the males is more extended, reaching down upon the sides, its length 0.12.

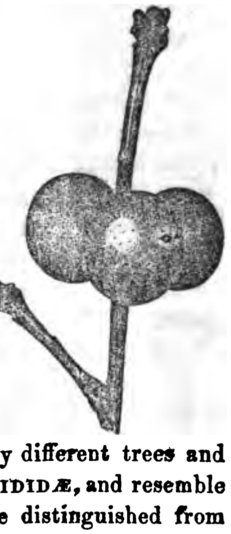
Although Dr. Harris regards these two flies as varieties of one species, they certainly are very distinct, differing in size, clothing, color and structure, insomuch that they pertain to two different genera. The first is bearded over with fine short gray hairs, whilst the other is smooth. Its sting is also evenly bearded with longer coarser hairs, which are wanting in the other. The second veinlet of its wings is bent nearly to a right angle, whilst in the other it is straight. The antennæ have the same number of joints (15 and 14) in the sexes of both, but in the one fly they are black, in the other pale yellow, and with the joints evidently shorter. And

I cannot but think that further researches will show that the galls from which they come grow upon different parts of the white oak, if those of both flies really be produced by this one tree; and that the galls themselves will present some differences in their structure. My specimens of the smaller brighter colored fly were found in a jar in which had been placed quite a number of galls, and which had produced an equal number of the larger flies, and several parasites, whereby it was impossible to ascertain the particular galls from which they respectively came.

I retain the name of Dr. Harris for the species of which he gives an independent description, and which he says comes out in June and July; and present a new name for his dark colored variety, specimens of which I have captured on the wing early in May, and again in September, and which thus appears to be two-brooded, whilst of the other there is probably but one generation annually.

The species which I present as new, is subject to considerable variety in its colors. A broad tawny red ring usually surrounds its eyes, and on each side of its thorax is one or more spots of the same color. Sometimes the scutel is also red, and the under side and tip of the abdomen is frequently of a resin-like red color, instead of black. Its wing veins are black and the second transverse veinlet is margined with smoky along its hind side. This veinlet is angularly bent not only at half the distance from its outer end to the small central cell, but also a second time, where it forms the hind boundary of this cell, and hereby the cell, instead of its usual triangular form, has the shape of a spear head in this species. Its size, its aspect, and some other characters are similar to the Oak-apple and Cloudy-winged gall-flies, under which latter species, § 318, its generic relationship will be more particularly stated.

These bullet-like galls are most common and oftenest noticed of any of the galls on our oaks. When growing they are of a pale greenish color, shaded into bright red upon the side which is most exposed to the light, and with the fading of the leaves in autumn, they also fade to the same pale dull yellow hue with the dead leaves, even though the insect be still inclosed in them, to pass the winter, as it sometimes is.



I have obtained two parasites from these galls. They probably destroy both kinds of these flies indifferently, and also the flies of other galls; for the parasites of these gall insects are not limited, each to a particular species, as we know from frequently obtaining the same parasite from the galls of totally different trees and shrubs. These parasites pertain to the family CHALCIDIDÆ, and resemble gall-flies in their general appearance, but are at once distinguished from the latter group of insects by the absence of veins in their wings. In addition to the galls from which they are bred, only a brief description will be required to enable one to recognize them.

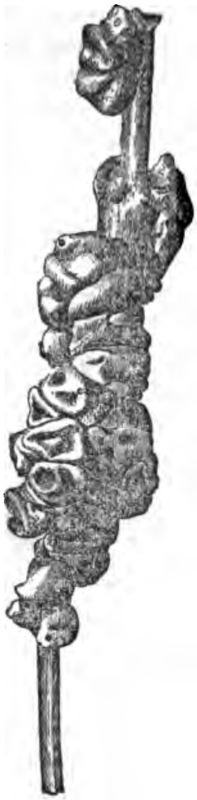
The **OAK-BALL PARASITE**, *Macroglenes Querci-globuli*, new species.

This much resembles the gall-fly from which it is named, in its size and general appearance. It is black, with the basal joint of the antennæ and the legs dull white, the thighs pale dull yellow, and the abdomen tinged with this last color along its under side. Length 0.15.

The **OAK-BULLET PARASITE**, *Pteromalus onerati*, new species.

This is smaller and more beautifully colored than the preceding, being of a brilliant coppery hue with a green reflection, and the under side of its abdomen golden yellow. Its legs are sulphur yellow and its antennæ dark brown with the first joint pale yellowish. It is 0.10 in length, with the females somewhat larger. I have also obtained this species from one of the galls of willow twigs.

314. **OAK-FIG GALL-FLY**, *Cynips Quercus-ficus*, new species.



Surrounding the twigs of white oaks in a dense cluster, resembling preserved figs packed in boxes, each molded to the shape of those pressing against its sides, hollow bladder-like galls of the pale dull yellow color of a faded oak leaf, each gall producing a small black fly with the lower half of its head, its antennæ and legs pale dull yellow, its hind shanks dusky and its abdomen beneath reddish-brown, its antennæ with fifteen and in the female thirteen joints. Length 0.06, females 0.10, and to the end of their wings 0.14.

These galls are common upon the long slender shoots of young and thriftily growing white oaks. No comparison occurs to me which will give so correct an idea of their appearance, as that of preserved figs, as we see them packed in boxes, each conforming to the shape of those surrounding and pressing against it on every side, and their outer surface showing irregular rounded elevations with intervening hollows and fissures, resembling the convolutions of the brain or of the intestines. These masses of galls sometimes form a roundish ball, a half or three-fourths of an inch in diameter, with the twig passing through its center. But more frequently they extend along the twig three, six or more inches, in an uneven knobby mass.

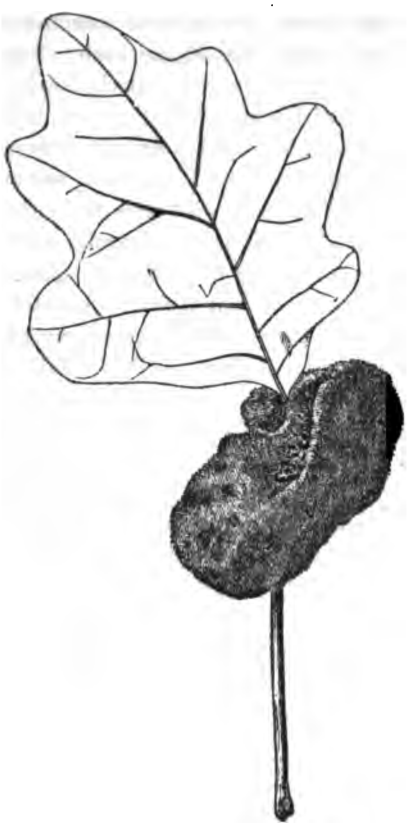
It is interesting to notice the first commencement and subsequent growth of these galls, which is as follows: The female pierces the bark with her sting and inserts a number of eggs at short distances from each other, sinking them into the wood beneath the bark, it would appear, for a little discolored spongy spot runs inward from each gall to the pith of the limb. The wounds of the bark from these punctures become so entirely healed that no indications of them can be detected with a magnifying glass. But a little smooth round swelling or elevation of the bark soon commences above each egg, which swelling increases, until at length the bark bursts and a small round granule, the size of a pin's head, protrudes from the opening. These grow more and more, resembling a cluster of grapes when they have attained half their size and are beginning to crowd one against another. They finally attain from a quarter to a half inch in diameter. Their outer surface is covered with fine short hairs, which become rubbed off from their more exposed parts. The worm lies in a small oval cavity at the base of each gall, the walls of this cavity being whitish, tough and leathery, resembling a small seed, from the outer surface of which numerous crinkled, brittle, wooly fibers of a rusty yellow color radiate to the outer envelope of the gall, which is a thin paper-like membrane, soft and flexible when moist but brittle and breaking from a slight pressure when dried. Most of these galls are found perforated in the winter season, when they and all other excresences are more particularly noticed, the fall of the leaves then exposing them to view; but particular clusters will at that season be discovered with the insects still remaining in them, to come forth the following June. There hence appears to be two broods of this fly annually, one having come from the perforated galls the preceding summer, whose eggs have produced the unperforated galls in which the insects repose during the winter.

The fly from these galls is very similar to that of the Oak tumor, differing from that species only in being slightly larger, with its abdomen paler beneath, and in having more joints in its antennæ.

315. WOOL-SOWER GALL-FLY, *Cynips seminator*, Harris.

A round mass resembling wool, from the size of a walnut to that of a goose egg, growing on the side of or surrounding white oak twigs, in June of a pure white color or tinged or speckled with rose red, and in autumn the color of sponge; producing small shining black gall-flies with bright tawny yellow legs and antennæ and in the female the head and thorax cinnamon red; their antennæ of fifteen and fourteen joints, length 0.08 and the females 0.11.

These galls first show themselves on the thriftiest young succulent shoots in the month of June, and they then resemble a lock of fine soft wool of a pure white color or with a delicate rose red tinge upon one side, or sometimes they are clean white with numerous elevated points of deep rose red, and are then truly beautiful in their appearance. From these galls I have obtained the flies the fore part of July. These flies immediately sow their eggs for another crop, and the oak twigs having now become harder and more woody, the galls growing on them are of a coarser



texture and duller color, resembling a ball of sponge rather than wool. These remain through the winter, though their attachment to the twig is so slight that birds picking into them, they are often torn off and fall to the ground. Internally, adjoining the twig, they consist of a mass of white hard grains resembling seeds, each of which yields a fly.

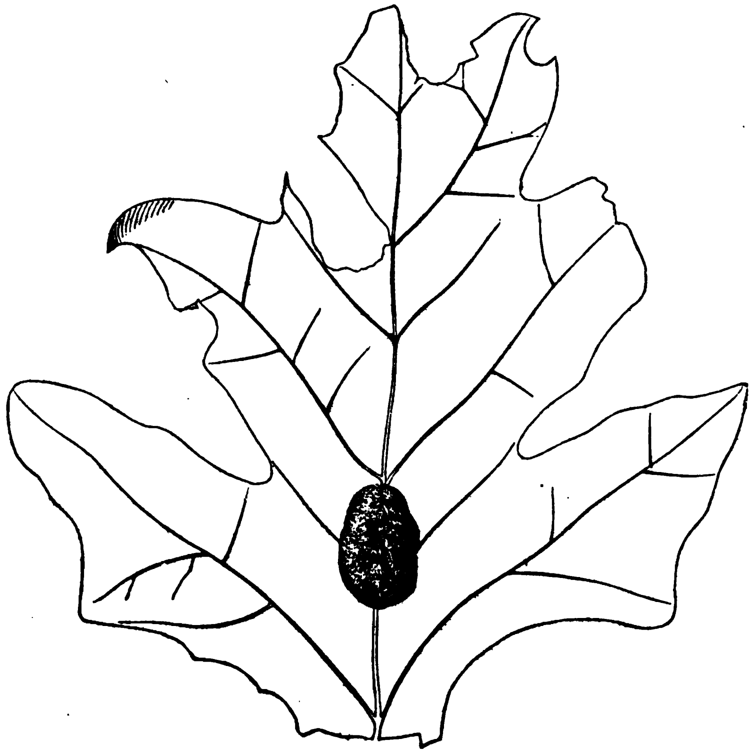
The two sexes differ remarkably in their colors, the head and thorax being black in the male, with the mouth only cinnamon red, whilst in the female the whole of these parts is of this color, the abdomen only being black. It is the male only which is described by Dr. Harris, and a person with specimens of the female in his hands would not suspect them to be the species of which he treats. The female is much the most common. A single gall gave me forty specimens of this sex and only one male.

AFFECTING THE LEAVES.

316. OAK-WOOL GALL-FLY, *Cynips Quercus-lana*, new species.

A round mass resembling wool, the size of a hazelnut or walnut, and of a white or buff color, growing upon one of the principal veins on the under side of white oak leaves, and producing several small black flies with white or straw colored heads, antennæ and legs, and with shining smoky yellow abdomens, having a black or blackish cloud occupying their back and sides, the females with fifteen-jointed antennæ, and their length 0.09.

It is not a little curious that two insects so nearly identical as the Oak-tumor and the Oak-fig gall-flies, should produce galls which are totally dissimilar—the one being merely a smooth swelling of the bark, the other a mass of semi-collapsed bladders the size of acorns crowded together around the limb—whilst here, on the other hand, we have two insects which have little resemblance to each other, yet producing galls which can scarcely be distinguished the one from the other. No one noticing on our white oaks these little round bunches of buff colored wool in which the young of the Wool-sower and of the Oak-wool gall-flies are cradled, growing perhaps but a few inches apart, one on a leaf the other on a twig, would suspect



anything else than that both were the same thing, produced very probably by a single insect puncturing and inserting a part of its eggs in the vein of the leaf and then moving a short distance aside and bestowing the remainder on the adjacent twig—dividing them thus, as do many other insects, to increase the chances for a portion of its young to escape destruction should any casualty befall them in the one or the other place. And if a person were curious to know the kind of insect which with such maternal care had formed these velvety little beds for the secure and comfortable repose of its young, he would scarcely deem it worth his while to gather but one of the two bunches; though to make the research more certain of a successful issue he might perchance secure them both. And on placing them in a covered tumbler and moistening them occasionally, till after a time a multitude of little black flies made their appearance in the glass, what would be his astonishment to find there were four different kinds of insects there, when he had expected to see but one. The result would be a riddle, a perfect paradox to him, unless from being somewhat versed in the habits and aspects of this class of creatures, he would be able to discern that two of these kinds being gall makers must have come one from the one wad of wool and the other from the other—thus showing these two little tufts of wool to be in reality two distinct natural substances, although the only perceptible difference between them is that one grows upon the leaves and the other upon the twigs. And the other flies in the glass being found of the parasitic kind, he would perceive they must have subsisted on and destroyed other individuals of these gall makers, and had thus come out of the galls in their stead. Thus, where he supposed he had simply one vegetable production from which a single kind of insect would come, he finds nature has actually formed two of the former and four of the latter. With such astonishing profusion and seeming superabundance is every little corner and recess in the domain of nature diversified and teeming with life.

Internally in these little masses of wool are numerous hard seeds about the size of grains of wheat, of a bright chestnut color, crowded together and attached by their lower ends to the vein of the leaf. In each of these is a worm, which, on completing its transformations, gnaws off the upper end of its cell, and eats directly outward through the wool and escapes from its confinement, hereby making the same pin-hole perforations in these soft wooly galls that are seen in the other harder kinds when the insects have evacuated them.

I have not succeeded in obtaining the males of this species, its galls having in all but one instance yielded me parasites only. This is the more remarkable, since, from the very similar galls of the wool-sower growing on the twigs, I have never obtained any insects of this kind. And it would hence appear that the one gall being firmly fixed whilst the other vibrates and swings with the leaf, nature has left the multiplication of the one to be checked by the birds, and they being unable to pick into the other, these parasitic destroyers have here been formed and commissioned to execute the same work.

Like most of the other parasites which infest this group, these pertain to the family CHALCIDIDÆ, belonging to the same order of insects with the gall-flies. They may be named and distinguished as follows:

The OAK-WOOL PARASITE, *Spalangia Querci-lanæ*, new species.

Black, with the face, antennæ, sides of the collar, and legs whitish or greenish-yellow. Length 0.08 to 0.10. Some individuals have the upper side of the hind thighs and of the first joint of the antennæ black. The abdomen is smooth and polished, its under side of a tawny red color, and it is separated from the thorax by a pedicel. The stigma of its fore wings is a semicircular black shining spot with a small appendage on the inner side of its hind end and its base slightly separated from the robust rib-vein, which vein is of a dark brown or black color. Its cubical head, which is about as long as wide, indicates its relationship to *Spalangia*, though in some other respects it does not appear to fully coincide with the characters assigned to this genus.

Specimens frequently occur, so very different in their colors that they might almost be deemed a distinct species. They may be termed the Line-backed variety (*dorsalis*) of the Oak-wool parasite. In them the thorax is pale greenish yellow, with a black stripe along its middle, and the abdomen is yellow, with the back black, and commonly with black bands upon its sides.

The WOOL-TUFT PARASITE, *Eurytoma lanulæ*, new species.

This is black throughout, with only its feet white and their tips dusky, and the abdomen smooth and polished. It is 0.08 long. This is less common than the preceding, and is obtained as frequently from galls on willows, as from these wooly galls on oak leaves.

317. OAK-APPLE GALL-FLY, *Callaspidia confluenta*, Harris.

Large smooth globular galls resembling apples, growing on the larger veins on the under side of the leaves of the red oak, each gall producing a large black gall-fly with deep tawny red legs, and its wings with a smoky brown spot margining the second veinlet on its hind side, the female antennæ with thirteen joints, her length 0.25.

This is our largest kind of gall-fly. There are probably two generations of it annually, for early in June the galls are found upon the trees grown to their full size, which varies from an inch to an inch and three-quarters in diameter. Their attachment to the leaf is so slight and brittle that when the leaves are agitated with a strong wind numbers of them break off and fall, so that the ground under particular trees is copiously scattered with them, even when they are but half or two-thirds grown, the latter part of May. They then resemble large nice smooth gooseberries, being of a lively pale green color, freckled with large blackish or purplish brown dots, and clear and semi-transparent when held between the eye and the light, with an opake cloud-like spot in their center. Cut open, this central spot is seen to be a pale greenish yellow ball the size of a pea, with numerous white threads beautifully radiating from its surface to the outer wall, and holding this ball in its place in the otherwise vacant cavity. On cutting this ball asunder it is found to be very juicy and white internally, with a round cavity in its center, in which lies a small plump white maggot, curved into the shape of a crescent, and lying motionless and without any signs of life. The exterior wall is 0.05 thick, or about the thickness of the rind usually taken from an apple when it is peeled, and of a similar succulent juicy texture.

These green immature galls, so smooth, plump and semi-transparent, have a most tempting appearance, as though they were some fine juicy fruit, of which the taste will be delicious. But though so tender and succulent they are perfectly tasteless, neither the outer rind nor the central ball having any perceptible flavor. But their luscious aspect, in connection with their popular name of "Oak apples," excites the children in many neighborhoods all over our country, to gather and eat them, rejecting the central core containing the worm. They are probably inert and destitute of any effect when thus eaten. Certainly they are not deleterious. A school teacher who was recently employed in Michigan, in a school house which was surrounded with shrub oaks which were loaded with these galls, informs me that for many days the pupils at every recess were filling their pockets with them, and eating them almost incessantly, yet without ill effects therefrom in any instance.

318. CLOUDY-WINGED GALL-FLY, *Callaspidia nubilipennis*, Harris.

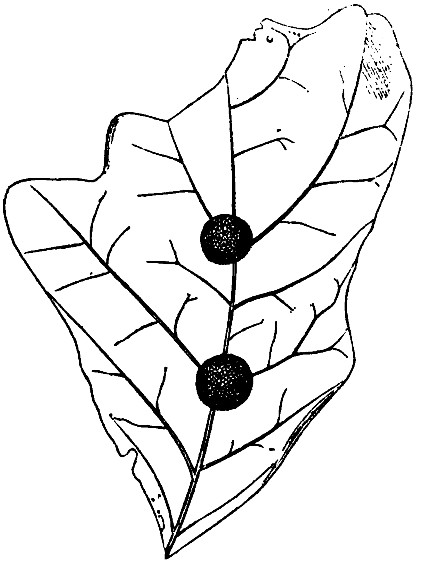
Galls like the preceding, but only the size of a hazelnut or grape, growing through the leafy expansion of the red oak, a third of the sphere projecting from the upper surface of the leaf and the remainder opposite on its under side; producing a large black gall-fly with tawny yellow legs and its wings smoky on their disk and tips, with none of the veins continued into the margin, the antennæ thirteen-jointed in the female, which is 0.20 long, and to the tips of her wings 0.30.

I met with this fly among fallen oak leaves early in April, where it might have been reposing through the winter; and from the brief, indefinite notice which Dr. Harris gives of it and its gall, I infer it to be from the gall above described, which I have only found after the fly had escaped. Galls perfectly the same, however, except that they show no vestiges of any attachment to a leaf, being smooth and even on every side, are sometimes found among fallen leaves, perforated, early in the spring.

This species and the Oak-apple gall-fly, having none of the wing veins prolonged into the margin, and the scutel obtuse and rough, will belong to Dalman's genus *Callaspidia*. But while the antennæ are thread-like in the Oak-apple gall-fly, they are slightly thicker towards their tips in the present species, and are also shorter, not reaching the base of the thorax. The second veinlet of the fore wings is curved like a bow in both these species, which appears to be a generic character of much value. And I do not hesitate in referring the Oak-bullet gall-fly (*C. Quercus-globulus*) to this genus also, notwithstanding the one additional joint in its antennæ, its aspect being so very like that of the Oak-apple gall-fly, as Dr. Harris has observed. Its size, its pubescence, its second veinlet edged with smoky along its hind side and angularly bent, show its greater affinity to these than to the species of the genus *Cynips*. And the outer longitudinal or subcostal vein dces not fully reach the margin, although it is much less widely separated therefrom than in the two other species. On the whole, it should probably be regarded as forming the type of a new genus.

319. OAK-PEA GALL-FLY, *Cynips Quercus-pisum*, new species.

On a vein on the under side of white oak leaves, a globular gall resembling a pea, its surface finely netted with fissures or cracks and intervening elevated points like the surface of a strawberry, usually with two cavities in its center divided by a thin partition; producing a black gall-fly with legs, antennæ and the valve of the lower tip of its abdomen pale dull yellow or straw color, and also the face and mouth in the males, the antennæ fifteen-jointed, in the females thirteen and dusky towards their tips. Length 0.08. female 0.11 and to the end of her wings 0.16.



These galls are not rare, and in the same situation a similar though somewhat smaller gall occurs, the surface of which is smooth; but from these I have not yet succeeded in obtaining the fly. When young the surface of these galls is rough, but not cracked into the net-work of lines that is afterwards seen. The interstices between these cracks are sometimes flat but oftener show an elevated point or pimple in their center. The galls are carried to the ground with the leaves when they fall in autumn, the insects remaining in them till the following spring. They are of a pale greenish yellow color tinged on one side with red, when growing, but fade in autumn to the same color as the dead leaves.

In addition to gall-flies the two following parasites come from these galls, hatching therefrom as early as the middle or latter part of April. The first of these is oftenest obtained, and what appears to be the same species comes also from galls upon whortleberry bushes.

The OAK-PEA PARASITE, *Macroglenes Querci-pisi*, new species.

Black, the feet white, the hind thighs black and their shanks black in the middle, the four anterior thighs black or brown in the middle and their shanks white but often in the middle brown, the eyes red. Length 0.10 to 0.13.

The OAK-PILL PARASITE, *Pteromalus Querci-pilulæ*, new species.

Brilliant green tinged with coppery, the legs light tawny yellow, their thighs brilliant green in front, black behind, the middle pair tawny yellow with a green-black stripe above and another beneath, the feet dull white with black tips, the abdomen with a fine gray beard; its conical tip purple black. Length 0.18.

The gall from which this parasite came had but a single cavity in its center, instead of the two usually found there; and I suspect that having consumed one of the larvæ of the gall-fly, it breaks through the thin partition dividing the cells, and then feeds upon the other, this amount of nourishment being apparently necessary to complete its growth to a size so much larger than that of the gall-fly and the other parasite which subsists upon it.

OAK. LEAVES.

320. CHINQUAPIN-OAK GALL-FLY, *Figites Chinquapin*, new species.

Arising perpendicularly or obliquely from the upper surface of the leaves of the Chinquapin oak (*Quercus Chinquapin*), like pins inserted therein, little slender club-shaped galls nearly a half inch long, formed of a pale green elliptic head like a minute pod, tapering into a slender dull brown stalk twice as long as the head, the surface thinly clothed with fine short hairs; producing a small black gall-fly with bright tawny yellow antennæ and legs, its length 0.10.

These singular little galls are met with in May, one or more growing upon the same leaf. The walls of the little pod at their summit are exceedingly thin and the fly comes out through a round hole which it gnaws near the upper end. It is remarkably large in comparison with the small delicate gall in which it is nurtured. Its antennæ in the female, the only sex known to me, are thirteen jointed, thicker towards their ends, and do not reach the base of the thorax. The second veinlet of its wings is angularly bent. Its scutel has a slight furrow in its middle; and the suture, on each side of its base, is widened into a small roundish excavation.

OAK SPANGLES, perfectly the same as noticed by Westwood, Introduction, vol. ii, p. 130, occur on the under surface of the white oak leaves in this country. These are small circular flat scales, less than a quarter of an inch in diameter, varying from a pale to a bright vivid rose red color, fading to dull red in autumn, and are attached to the leaf by a short slender footstalk. So much do they resemble a parasitic plant growing upon the leaf that they have been a subject of much controversy among writers. I have not as yet succeeded in obtaining the flies from them; but they will no doubt yield a species different from that of Europe. For, it may have been observed, that several of the galls above described appear to be the same with some of those growing on the oaks of the old world, yet the insects coming from them are manifestly different.

321. FOREST CATERPILLAR, *Clisiocampa silvatica*, Harris. (Lepidoptera. Bombycidæ.)

A caterpillar closely resembling that of the Apple-tree, § 28, but at once distinguished from it by having a row of diamond-shaped or oval white spots along the middle of its back instead of a white stripe; living in large societies, under a slight thinly-woven cobweb-like nest placed lengthwise against the side of the tree, and coming out to feed upon the leaves; when nearly grown dispersing themselves and wandering about; spinning a cocoon like that of the Apple-tree caterpillar, in which it lies twenty days, the moths appearing abroad the fore part of July, these being pale umber brown or cinnamon color, their fore wings gray and crossed by two narrow oblique bands, parallel with each other and with the hind margin, these bands dark brown instead of whitish as in the Apple-tree moth, and often obliterated by the whole space between them being dark brown; its width 1.25 and the female 1.75.

This caterpillar is particularly interesting from its close similarity in appearance and habits to our common and well known Apple-tree caterpillar. Its nests, however, are very seldom seen, even though diligently sought, being of so slight a texture and placed along the side of the trunk or of one of the larger limbs of the tree, and hereby rendered inconspicuous. It is only after the worms leave their nests and are leisurely rambling about singly, that they come to our notice. Almost every year, the fore part of June, some three or four of these wanderers may be observed, and occasionally a season arrives when they are remarked as much more common, but never numerous. This, in brief, has been their history, within the sphere of my own observation. Abbot states (Insects of Georgia, p. 117,) that they are "sometimes so plentiful in Virginia as to strip the oak-trees bare." He was probably misinformed, however, upon this point; for Dr. Morris, of Baltimore, informs me they are no more common in that district than I represent them to be here in New York, and nothing approaching to the statement of Abbot has ever been known there, at least by the present generation. In his own vicinity in Georgia, Abbot says it is rare. It thus appears that this caterpillar is about equally diffused throughout our country and is nowhere common.

The CATERPILLAR, as seen after it has forsaken its nest and is wandering about, is an inch and a half long and 0.20 thick. It is cylindrical and of a pale blue color, tinged low down on each side with greenish gray, and is everywhere sprinkled over with black points and dots. Along its back is a row of ten or eleven oval or diamond-shaped white spots which are similarly sprinkled with black points and dots, and are placed one on the fore part of each segment. Behind each of these spots, is a much smaller white spot, occupying the middle of each segment. The intervening space is black, which color also forms a border surrounding each of the spots, and on each side is an elevated black dot from which arises usually four long black hairs. The hind part of each segment is occupied by three crinkled and more or less interrupted pale orange yellow lines, which are edged with black. And on each side is a continuous and somewhat broader stripe of the same yellow color, similarly edged on each of its sides with black. Lower down upon each side is a paler yellow or cream colored stripe the edges of which are more jagged and irregular than those of the one above it, and this stripe also is bordered with black, broadly and unevenly on its upper side and very narrowly on its lower side. The back is clothed with numerous fine fox-colored hairs, and low down on each side are numerous coarser whitish ones. On the under side is a large oval black spot on each segment except the anterior ones. The legs and prologs are black and clothed with short whitish hairs. The head is of a dark bluish color freckled with numerous black dots and clothed with short blackish and fox-colored hairs. The second segment or neck is edged anteriorly with cream white, which color is more broad upon the sides. The third and fourth segments have each a large black spot on each side. The instant it is immersed in spirits the blue color of this caterpillar vanishes and it becomes black.

Several of these caterpillars found abroad upon the last days of May and inclosed in a cage ate scarcely anything afterwards, yet did not spin their cocoons until the 16th and 18th of June, and the moths come out therefrom twenty days afterwards on the 6th and 8th of July. It selects a sheltered spot for its cocoon, such as a corner or angle formed by the meeting of two or three sides. Across this angle it first draws a curtain, which is thinly woven of white silk threads, nearly two inches in length and width. Under the space thus inclosed similar threads are crossed in all directions, in the center of which the inner pod-like cocoon is suspended. This is about an inch in length and half as broad, and is placed perpendicularly, obliquely, and probably horizontally also, according to the direction of the angle in which it is situated. It is more closely and evenly woven than the parts exterior to it, and like similar fine muslin fabrics from human looms, it is "starched" by the manufacturer, to render it more stiff, smooth and substantial, the meshes between the threads being filled with a thin yellowish paste from the mouth of the caterpillar, which dried, gives the cocoon the appearance of being thinly dusted with powdered sulphur. The inclosed insect can be faintly seen through its walls. The moth issues from the upper end of the cocoon, by crowding the threads there apart after it has softened and loosened them by wetting them with a fluid from its mouth, which imparts a pale brown tinge to the orifice thus formed.

The MALE MOTH usually measures 1.20 across its spread wings. Its thorax is densely coated with soft hairs of a nankin yellow color. Its abdomen is covered with shorter hairs which are light umber or cinnamon brown on the back and tip and paler or nankin yellow on the sides. The antennæ are gray, freckled with brown scales, and their branches are very dark brown. The face is brown with the tips of the feelers pale gray. The fore wings are gray, varied more or less with nankin yellow, and they are divided into three nearly equal portions by two straight dark brown lines which cross them obliquely, parallel with each other and with the hind margin. The space between these lines is usually brownish and darker than the rest of the wing, being quite often of the same dark brown color as the lines, whereby they become wholly lost. Sometimes the hind stripe is perceptibly margined on its hind side by a pale yellowish line. The fringe is of the same dark brown color with the oblique lines, with two whitish alternations towards its outer end. But sometimes it is of the same color with the wings and edged along its tip with whitish. The hind wings are of a uniform pale umber or cinnamon brown, sometimes broadly grayish on the outer margin, and across their middle a faint darker brown band is usually perceptible, its edges on each side indefinite. The fringe is of the same color with the wings or slightly darker and is tipped with whitish. The under side is paler umber brown, the hind wings often gray, and both pairs are sometimes crossed by a narrow dark brown band, which on the hind wings are curved outside of the middle. All back of this band, on both wings, is often paler, and more so near the band.

The FEMALE is 1.75 in width, and in addition to the shortness of the branches of her antennæ, differs from the male in her fore wings, which are proportionally narrower and longer, with their hind margin cut off more obliquely and slightly wavy along its edge. Hence also the dark brown lines cross the wings more obliquely, the hind one in particular forming a much more acute angle with the outer margin. And all the wing back of this line is sometimes paler or of a brownish ashy color. And the fringe of these wings has not the two whitish alternations which are often so conspicuous in the male. The head and fore part of the thorax is cinnamon brown. The abdomen is black, clothed with brown hairs, though very thinly so on the anterior part of each segment, where these hairs are intermingled with silvery gray scales.

The scales of the wings of this moth are very slightly attached, rubbing off with the gentlest touch, as though they were mere dust that had fallen upon the wings. Hence it is almost impossible to secure specimens which are perfect and uneffaced, the insect fluttering with such strength and extreme vivacity when captured. And individuals taken when abroad in the forests are usually worthless for the cabinet, all traces of their marks being obliterated and the wings having become more or less transparent from this loss of their scales.

In addition to the oak this caterpillar is found upon the apple and cherry, the walnut and other trees. On the apple-tree it is said to be more voracious and injurious than the common caterpillar, often nibbling the stems of the young apples and causing them to wither and fall.

Other caterpillars and large thick-bodied worms occurring on oaks are the larvæ of

The Hickory tussock moth, § 183.
The American lappet moth, § 84.
The Io emperor moth, § 81, and
The Polyphemus moth, § 181.

322. Senatorial Dryocampa, or Yellow-striped oak-worm, *Dryocampa senatoria*, Smith and Abbot. (Lepidoptera. Bombycidæ.)

In August, consuming the leaves, a black worm with four orange yellow stripes upon the back and two along each side, with two long black horns back of its neck and the rings of its body with two black prickles above and two on each side; burying itself some five inches below the surface and the following June producing a large bright ochre yellow moth, its wings often freckled with blackish spots, the forward pair having a large white dot near the center and a faint purple streak from the middle of their inner edge to the tip; its width 2.50; the male much smaller, 1.75 wide, and its wings of a much darker purplish red color, but with the same white dot and dark streak.

These worms occasionally become quite numerous in particular neighborhoods. The latter part of August, 1858, I observed them in greater numbers than I had ever before seen, in the cemetery at Saratoga Springs, where they had stripped most of the oaks of their leaves, and were then descended from the trees, probably in search of food elsewhere, as few of them appeared to be grown to their full size. They were everywhere crawling sluggishly about, upon the surface of the dry sandy soil and up the sides of the monuments. In the paths, the dresses of the ladies sweeping over them, these worms frequently adhered to and crawled up them, to the great annoyance of every one and the alarm of the more timorous. Nor was this alarm altogether groundless. The prickles of these worms, if they happen to penetrate the skin, produce a stinging sensation like that of nettles and a slight redness of the spot, both these symptoms, however, lasting but a short time, as in the case of nettle stings. Relief in all such cases is speedily obtained by bathing the part with tincture of opium (laudanum), or with spirits of camphor.

The larva when full grown is two inches long and about the thickness of a lead pencil, cylindric, and of a coal black color in stripes alternating with orange yellow, as follows: Along the middle of the back is a black stripe with a yellow one of the same width on each side of it. Outside of these is a broader black stripe followed by a yellow one on each side of the back slightly broader than the two middle ones. Below these is another black stripe still wider than the one above, and below this along the sides are two yellow stripes with a black one between them in which the breathing pores are placed. The upper of these two last yellow stripes is somewhat wavy and less smooth than those on the back, and the lower one is often widened on the fore part of each segment, or sends off a branch downward and backward. Below this is an oblong yellow spot on each segment, which is sometimes lengthened to unite its anterior end to the lower yellow stripe. The under side is black with a yellow stripe along the middle, which is more or less interrupted. The legs and prolegs are black. The yellow stripes are not prolonged upon the posterior and the two anterior rings, but are here often replaced by small yellow spots. The head is black. The skin is tough and leathery, with numerous small elevated smooth grains, of which two on the fore part of each segment, placed in the yellow stripes, are larger and are sometimes elevated into small prickle-like points, and two others, similar to these, also occur posteriorly on each segment, but placed further apart. In addition to these there are six larger, black, shining, conical prickles in a transverse row around the middle of each ring, some of which are occasionally forked at their tips into two sharp points. On the second ring in place of the two upper prickles are two black curved cylindrical horns, equalling two of the rings in length, and usually standing obliquely upwards and forwards, their tips blunt and shining. The last segment is rough from several prickle-like points of different sizes.

The moth is quite simple in its colors and marks, compared with its larva, presenting nothing to notice in addition to what has already been given above, except those structural characters which belong to other species of the genus in common with it.

323. SPOTTED-WINGED DRYOCAMPA, or THORNY OAK-WORM, *Dryocampa stigma*, Fabricius.

Eating the leaves in September, a worm like the preceding, but of a bright tawny or orange color with a dusky stripe along its back and bands on its sides, and its prickles lengthened into thorn-like points; producing a moth with similar colors and marks, but having in addition thereto a slight purplish streak across the middle of its hind wings and a curved purple band near the base of the fore ones, and both pairs always freckled with blackish, its width 2.50 to 3.00, the male 1.75 and its wings ochre yellow.

The skin of this worm has numerous white elevated points or granules of different sizes, as in the following species, but differs from that and the other species of this genus in not having its colors arranged in stripes, except the single dusky one along the back. On the hind part of each ring is a dusky band, which is widened at the breathing pores. The prickles also are longer in this than in the other species, forming thorn-like points, of which those of the two rows upon the back are the tenth of an inch long, with one, two or three smaller prickles branching from them. The two horns back of the neck have the same blunt shining tips as in the preceding species.

The female moth has the fore wings usually of a purplish red color forward of the anterior band and behind the posterior one, and this color is frequently tinged more or less with glaucous-like gray. The anterior band is strongly curved, or rather, is abruptly bent slightly outside of its middle. This band is obliterated in many specimens. The narrow cloud-like streak of darker purplish red across the middle of the hind wings is sometimes quite distinct, and in other instances its presence can merely be discerned. Thus this moth sometimes can scarcely be distinguished from the preceding.

324. CLEAR-WINGED DRYOCAMPA, or OLIVE-GRAY OAK-WORM, *Dryocampa pellucida*, Smith and Abbot.

Eating the leaves in July, a two-horned prickly worm of an obscure olive gray or greenish color with dull brownish yellow stripes and its skin rough from white granules; remaining under ground in its pupa state through the winter, and the fore part of June producing a large ochre-yellow moth with thin and semi-transparent wings of a purplish red color throughout, with a very large white dot near the center of the fore pair and a faint darker streak; its width 2.50; the male 1.75, with the fore wings hyaline except on their margin.

For many years this worm has been common on the white oaks in my own vicinity, where the preceding has seldom been seen; and though the Yellow-striped oak-worm is so abundant only twenty-five miles distant from my residence, I have never met with it here.

When full grown, these worms are two inches long and as thick as a pipe stem. They vary somewhat in their colors, being oftenest obscure grayish yellow or grayish green, but sometimes blackish. Along the back is a broad stripe of this color, interrupted at the sutures by pale brownish yellow, and with a narrow blackish line on the middle of the back. Each side of this is a dull brownish stripe, below which is a broader one of the same color with that on the back, and having a whitish streak along its middle and the breathing pores in its lower margin. Below this is a second broad dull yellowish stripe, followed by a narrower dark olive green or blackish one, occupying the base of the prolegs, which below this stripe are black with a few small white granules, similar to those with which the surface is everywhere covered. The six anterior legs and the head are dull olive yellow. In a transverse row on the middle of each segment are six short polished black prickles, two above and two on each side, those on the hind segments being somewhat longer, and the two on the back are sometimes replaced on most of the segments by black dots. The two horns on the top of the second ring are the same as in the two preceding species. In smaller individuals, probably before the last change of their skin, these horns have been observed to have short branching prickles.

When alarmed the worm holds its anterior end rigidly upward and forward, with the horns extending obliquely forward and outward. Several of the worms are usually found near each other on the same limb, up to the time of their leaving the tree. They mostly enter the ground early in August, though some individuals may be seen on the trees as late as the middle of the following month.

325. TRIPLE WHITE-SPOT MEASURE-WORM, *Amilapis triplipunctata*, new species. (Lepidoptera. Geometridæ.)

Eating the leaves the fore part of June, a cylindrical gray measure-worm, 1.40 long, sprinkled with blackish dots and short lines, its head and neck slightly thicker than its body, each ring with a small squareish white spot above on its hind edge and with two blackish parallel lines on each side of this spot, its six anterior feet with a slight tinge of rose red; its pupa lying naked between the leaves, fastened by its tip; the beginning of July producing an ash-gray moth thickly sprinkled over with black dots and small brown spots, with the broad hind border of both wings dusky, which color is bounded on its fore edge by a somewhat scalloped narrow black band running parallel with the hind margin and having on its hind side near the outer margin of the fore wings three large contiguous white dots, whereof the outer one is largest and most distinct; its width 1.50.

This moth is so very similar in the cut and designs of its wings to the *unipunctata* of Haworth, that it may prove to be only a variety of that species, which I have never met with in this State, and know only from specimens received from Dr. Morris of Baltimore, and the figures and descriptions of authors. In these I discern no traces of but the one white spot, whilst here there are three, in a transverse row, contiguous and somewhat confluent with each other, their edges illy defined and the inner two less clear and bright, yet perfectly distinct. The colors also are gray and blackish, without any tinge of rusty yellow. The fore wings, as in *unipunctata*, show faintly a curved darker band near the base, and a straight cloud-like streak still more faint from the middle of the inner to the middle of the outer margin, in which is a faint black crescent-shaped spot near the center, and the black band or line margining the dusky hind border has back of its inner end a curved transverse gray spot, and at its outer end a broader one of the same color, occupying the space between the outer white spot and the outer margin. The larva, moreover, of this moth, appears to be unlike that of *unipunctata*, as described by Guenée* from a drawing of Abbot's; though there can be but limited confidence in the accuracy of descriptions thus obtained. And furthermore, the Single white-spot moth is said to come abroad at the end of the season.

Authors are discordant and in doubt with respect to the place of these moths in the family to which they pertain. I am inclined to think their true location is beside the genus *Hyperetis* of Guenée.

326. OAK-LEAF TORTRIX, *Argyrolepia Quercifoliana*, new species. (Lepidoptera. Tortricidæ.)

The fore part of June, the sides of particular leaves curved upward and drawn slightly together by numerous cobweb-like threads, beneath which lies a slender grass-green sixteen-footed worm, about three-fourths of an inch long and the thickness of a rye straw, which eats the end of the leaf, and passes its pupa state in the same situation; about the first of July giving out a small moth of a pale straw color with its body and hind wings glossy white, its fore wings prettily speckled with numerous small rusty yellow spots which run together in many transverse bands, leaving a space at their tips more vacant; its width 0.70.

The moth here noticed may frequently be captured in our forests the fore part of July. Its larva resides under a thin cobweb covering which it constructs over the upper surface of the leaf towards its end, hereby drawing the sides somewhat together into a concave shape. As it merely eats off the end of the leaf, transversely, moving its quarters further back as it thus consumes successive portions of it, it is obviously liable to do no sensible amount of injury, unless like some of its kindred, it has the habit at times of becoming excessively multiplied. But as the history of so very few of these small moths is at present known, I avail myself of this opportunity to place this species on record; and I add such a description of it as will henceforth serve for its clear identification.

---

* I regret that the important volumes of this author on the nocturnal Lepidoptera (Suites a Buffon) have not been in my hands a sufficient time for me to avail myself of them but slightly in the present Report. Hence, also, a number of species which I had prepared for insertion herein, are withdrawn, until their nomenclature can be revised and compared with that of these volumes.

The LARVA is grass green throughout, or towards each end and beneath of a slightly paler apple-green color, and along its back is a narrow stripe of a deeper green, produced by the internal viscera. It tapers slightly posteriorly and less so anteriorly. On each of its rings small pimples are symmetrically placed, from each of which grows a short white hair; and low down on each side is a slight fold of the skin, forming a slender elevated line. The head is round and slightly flattened and as thick as the neck into which it is sunk. If expelled from its retreat, it wriggles violently about, and by means of a fine thread drops itself very suddenly towards the ground and hangs suspended, till the disturbance ceases, whereupon it climbs up again to its former quarters.

The MOTH has fore wings which are twice as long as wide, their opposite sides parallel, their outer side very nearly straight with an inward curve at the base, their hind ends cut off somewhat obliquely and rounded like a slightly bent bow. Their surface is feebly glossy and about equally occupied by straw yellow and tawny or light brownish yellow, this latter color forming numerous small spots which are confluent into broken and irregular bands, the bands also running into each other. Two of these bands are more distinct and continuous, and when viewed vertically are of the same tawny yellow color with the other marks, but when viewed obliquely they are of a darker leaden or silvery brown hue, and are imperfectly edged with lines of a deeper brown color. One of these bands extends from the middle of the inner to the fore part of the outer margin. The other is almost parallel with this, running from the hind margin near the inner angle to the outer margin, where it is usually thickened or forked. The space back of this last band is slightly paler and less densely spotted, its only marks frequently being a broad oblique stripe from near the middle of the band to the tip, crossed by a curved band running nearly parallel with the hind margin, both these marks having the same leaden brown reflection with the two bands. Back of this on the hind edge and base of the fringe is a smooth tawny yellow band. The head is rough from loose scales, the feelers projecting in front like a short conical beak, their apical joint being small but distinct; and the spiral trunk is quite short, when uncoiled reaching but little beyond the tips of the feelers.

327. OAK LEAF-MINER, *Argyromiges Quercifoliella*, new species. (Lepidoptera. Yponomeutidæ.)

A whitish blister-like spot half an inch long and showing upon both surfaces of the leaves of the white oak, this spot on the upper side elevated into a fold, forming a cavity in the interior of the leaf, in which lies a small white flattened worm abruptly thicker at its fore end, which feeds on the interior of the leaf, and passes its pupa state in the same cavity, finally producing a minute snow-white moth, its fore wings pale golden yellow with a black dot on their tips, a white stripe on their outer side at base, and four triangular silvery white spots along the outer and two larger ones upon the inner margin, its width 0.30.

This leaf-miner is a minute worm which subsists upon the parenchyma or green pulpy substance inside of the leaf. This it consumes, leaving the cuticle or thin outer skin which covers it entire. The worm is flattened and little thicker than writing paper, appearing as though it had been distorted from being pressed between the two surfaces of the leaf. Upon the under side of the leaf its cell resembles a blistered spot of a dull nankin yellow color and an irregular oval form, half an inch long or a little more and half as broad. In smallish leaves this cell extends from near the mid-vein quite to the outer margin, where it is most elevated, the margin being often drawn together into a plait or fold as though it had been pinched between the fingers. Thus at this blistered spot a deep cavity is formed between the flat skin of the under side and the elevated fold of skin upon the upper side of the leaf. On this latter side the spot is white, more or less stained with dirty yellow and showing upon its surface a net-work of dirty yellow lines which are the veinlets of the leaves, made thus conspicuous by the parenchyma in the cells between them having been consumed. This dirty yellow stain renders the spot so opake that the worm inside can seldom be seen. This concealment is the more necessary, to enable the inclosed insect to elude the search of its enemies. It remains in this cell till near the end of its pupa state, held near the center of the cavity by a number of fine threads like cobwebs irregularly crossed in every direction. And when ready to disclose the moth, the pupa breaks through the thin dry skin of the under surface of the cell and crowds itself out till it is only held by its tip, when its shell cracks apart and the moth evacuates it. Sometimes a spider's web may be noticed on the under side of the blistered leaf, placed there with the evident purpose of entrapping this pupa when it breaks from its cell.

It is the latter part of summer when these blister spots begin to appear on the oak leaves. They occur upon the topmost leaves of the tallest trees as well as on those that are lower and near the ground. After the leaves have fallen in autumn, a portion of these blisters will be found empty, whilst others have pupæ or sometimes larvæ in them; showing that the moths come out from them in autumn and also in the spring.

The LARVA is white with a dusky or cinnamon brown stripe along its middle from internal alimentary matter, and the tips of its jaws are bright cinnamon brown. It is sparsely clothed with fine long white hairs. Its shape is analagous to that of a Buprestis larva, the segments of its thorax being much broader than those of the abdomen, which are of equal width. It has three pairs of legs anteriorly and three pairs of very small prolegs placed on the third, fourth and fifth narrowed abdominal rings.

The PUPA lies naked in the centre of the fine threads which the larva spins across its cell, without inclosing itself in a cocoon. It is at first pale yellow throughout, but the sheaths of its wings and legs afterwards become dusky and its head blackish. When disturbed in its cell it writhes or turns itself over and over, with much strength and vivacity.

The MOTH is snowy white with the antennæ and feet a little dusky. Its fore wings are pale golden or shining tawny yellow, with five white streaks on the outer margin, of which the first is longitudinal, placed on the margin and widened towards its hind end; the others are triangular and margined on their fore sides by a black line, the second and third ones being more transverse, and the fourth or last one is directed obliquely forward and inward. The two spots on the inner margin are also edged with black on their fore sides. The first of these spots forms with its opposite when the wings are closed a large crescent-shaped spot across the middle of the back, and the second forms a transverse diamond-shaped spot. The fringe is white with a dusky line on its base, and its outer half dusky also along the tip. The hind wings are white or cream yellow, and their fringe silvery white.

328. WHITE-OAK LEAF-MINER, *Argyromiges Querci-albella*, new species.

Eating the interior of White-oak leaves and hereby producing a white blister-like spot on their under sides, a minute flattened pale yellow worm which is gradually narrowed from before backwards, 0.18 long when mature, surrounding itself with a thin membrane-like wall forming an oval cell in the center of the cavity, in which it remains during its pupa state; producing a minute snow white and silvery moth, its fore wings pale golden yellow posteriorly, where are three black lines on the outer and two on the inner margin radiating from a common center and bordered with silvery white on their hind sides, and with a large black dot on the tip and a blackish stripe at the base; width 0.28.

The white blister-like spot of this leaf-miner appears on the under side of the leaf, with but slight, if any traces of its presence on the opposite side. It is broad oval and a half or three-fourths of an inch long. Among the fallen leaves in autumn those thus blistered may be found, some having the insect in its larva, others in its pupa state. The larva is very much flattened and tapers gradually from before backwards. It is divided into thirteen very distinct segments, including the head, by deeply impressed transverse lines. It is of a pale yellow color, with a deeper orange yellow band on the middle of each segment, and it also sometimes shows a dusky longitudinal stripe along the middle, from internal visceral matter. Its head is small, and its legs the same as in the preceding species. If ejected from its cell, it wriggles and lets itself down by a fine thread which it spins from its mouth. When it has finished feeding it stations itself in the middle of its burrow and then weaves around itself a curtain, from the floor to the roof, of a fine dense texture resembling the paper of bank bills. It thus forms a little oval cell nearly a half inch long and two-thirds as wide, and almost a tenth of an inch in height, the floor and roof being concave, as though they had been pressed outwards, thus making the apartment more roomy. In this cell the insect reposes during its pupa state, with its cast-off larva skin beside it, the black grains or castings of the worm and all other rubbish being outside of this in the burrow. The pupa is of a uniform dull orange yellow color, and of the same length with the larva.

The moth appears to be closely like the European *Argyromiges Clerckella*, but possessing some marks not mentioned by authors as present in that species. Its fore wings are snow white on their anterior half, with a shining silvery luster, and with a blackish stripe inside of their outer edge. Their posterior half is of a pale golden yellow color, with a large black dot at the tip and three or four triangular spots on the outer and two on the inner margin, each spot with a black streak on its anterior edge, which streaks radiate from a common center. On the hind margin is a black band. The fringe is white, tipped with blackish on the outer half of the wing. The long narrow hind wings and their long fringes are silvery white. I have captured these moths abroad in the woods the latter part of May.

2. THE LOCUST.—*Robinia Pseudacacia.*

AFFECTING THE TRUNK AND LIMBS.

329. **Locust-tree borer,** *Clytus Robiniæ,* Forster. (Coleoptera. Cerambycidæ.)

Boring a hole nearly a quarter of an inch in diameter, beneath the bark and more or less deeply into the wood, usually in an upward direction; ejecting its chips and worm-dust through an orifice in the bark; a yellowish white worm similar in its appearance to the Oak pruner, § 305 ; passing its pupa state in its burrow, and beginning to be seen abroad soon after the middle of August, and often seen during the autumn on Golden rod and other flowers; a black nearly cylindrical long-horned beetle from a half to three-fourths of an inch long, its legs and sometimes its antennæ tawny yellow, its globular thorax and its wing-covers ornamented with several bright lemon-yellow bands, of which the second one back of the base of the wing-covers forms a letter W.

This is a common insect, and the greatest obstacle to the cultivation of the locust-tree with which we have to contend. An instance of the devastation it is liable to cause may here be recorded. One of the principal thoroughfares leading east from the city of Utica, was formerly planted on its south side for some distance with locust-trees. These had become so large and ornamental as to render this one of the most admired avenues in the suburbs of that city, when, some thirty years since, these trees were invaded by this insect, to such an extent that in the course of two or three seasons they were totally ruined, many of them being killed outright and the remainder having their limbs and branches so lopped off that they could never recover from the deformity. We learn from Micheaux that fifty years since, this insect had become so destructive that many in different parts of our country were discouraged from planting the locust. Hitherto it appears to have been a pest chiefly in the older settled sections of our country. But it will no doubt in time show itself equally destructive in the newer districts. And in those parts of the western States where, to supply in some measure the natural deficiency of wood and timber, plantations of the locust are extensively made, it will probably yet prove to be a greater evil than it has ever hitherto been.

This insect abounds in all parts of the United States. A recent writer, in one of our agricultural periodicals, says it has not yet made its appearance on the west side of the Mississippi river; but from the number of specimens sent me year after year, by Wm. S. Robertson, from the Indian territory west of the State of Arkansas, it would appear to be more common there than in this section of the country. And it in all probability occurs over all that portion of our continent in which the locust grows.

Another writer says, it "is not of more than thirty years introduction into the United States." But Drury informs us he "received it from New York, where it is found on the locust-tree." And Forster says, it "inhabits the *Robinia Pseudacacia* in the province of New York." It hence appears that this beetle and its habits were known in our State almost a century ago. And fifty years anterior to these writers, Petiver gave a figure and description of it, in his "Gazophylacium," published in London in 1702, this being the first notice of it, probably, which has ever appeared. Moreover, as this beetle has never been found in any other part of the world, it was not introduced, but is undoubtedly a native species which has always existed here.

From our American authorities, one would be at a loss to know by what scientific name to designate this insect. It is the *Clytus pictus* of Dr. Harris's Treatise, the *Clytus Robiniæ* of Prof. Haldeman's Monograph, the *Arhopalus Robiniæ* of Dr. Le Conte's Monograph, though changed in the *errata* to *Arhopalus pictus*, and still later, in the Smithsonian Catalogue of Coleoptera, *Clytus flexuosus* is its preferred name. It fortunately happens in this instance, that of the several names the species has received, that which is preferable and most appropriate is that which also has the priority. It is circumstanced like another species which I have heretofore noticed. It was figured and described by Drury in 1770 but no name was then given to it. In 1771 Forster described it, naming it *Leptura Robiniæ*. Drury, in the appendix to his second volume, which was published in 1773, supplied the names which had been omitted in his first volume, terming this species *Leptura picta*. And two years after this, Fabricius, in his Systema Entomologia, first noticed this species, naming it *Callidium flexuosum*, removing it into his new genus *Clytus* twenty-five years afterwards. Dr. Le Conte refers it to the genus *Arhopalus* of Serville, making this genus more comprehensive than its author originally proposed, Serville himself placing it under *Clytus*. Which is the better generic arrangement I do not pretend to decide.

This beetle is so prettily and peculiarly marked that it will readily be recognized, from the short description given in the opening paragraph above. It is subject to some variations. The antennæ are either black or tawny yellow. Sometimes the base of the wing covers are tawny yellow. Sometimes the zigzag band resembling the letter W is white instead of yellow; and specimens even occur in which all the bands are white. This insect breeds in the black walnut as well as the locust, and it is said to be individuals reared in this tree which have the bands more or less white.

The only feasible method of checking the multiplication and destructiveness of these borers, which I am able to suggest, is, to plant a small patch of the Golden rod (*Solidago*) where locust trees are grown, that the beetles when they issue from the tree may resort to the flowers, as is their habit. They can readily be found thereon and captured and destroyed. It will be a pastime to the children of the household, whose sharp eyes qualify them well for this employment, to search these flowers, more or less frequently as the search is more or less successful, varying as it will with the commonness or rarity of the insects in different years, gathering and destroying all that are found thereon.

The LOCUST COSSUS, already described, § 294, bores similar but still larger holes and more in the interior of the tree. Fortunately it is a much less common insect than the Locust borer.

AFFECTING THE LEAVES AND TWIGS.

The IO EMPEROR MOTH, already described, § 81, I find is frequently reared upon the locust, and is the largest worm known to us feeding on the leaves of this tree. The parent moth deposits her eggs in a cluster side by side, glueing them to the under surface of a particular leaf, which leaf sometimes fades and turns yellow, probably in consequence of the weight thus placed upon it. The eggs hatch soon after the middle of July, and the young worms for two or three days remain huddled together upon the under side of the same leaf, feeding upon the shells of their eggs till they are wholly consumed, before they commence eating the leaves. They are at first of a totally different color from the large worm which we afterwards see, being dull yellow with black heads and small black prickles like the points of needles. They remain at rest during the day, and feed by night, all repairing to a leaf adjacent to that on which they were born, and eating its end off transversely till a third or more of it is consumed, when they repair to another leaf in the same vicinity. But if the leaf on which they are resting be touched by the hand, or if they in any other manner discover they are noticed, they on the following night migrate to another part of the tree, there clustering together again on the underside of a single leaf. But they soon grow to such a size that a single small leaf of the locust cannot hold the whole brood, when they begin to separate. After they have grown to a half inch or more in length they prefer the small young leafets at the end of the main stems, all of which leafets they eat, together with the tender succulent end of the stem, for a short distance downwards, and then leave it and repair to the end of another stem, feeding now some of the time by day. When they become so large that the under side of a leaf is quite too small to cover and conceal them, each worm draws three or four leaves around it with a few silken threads, forming a kind of loose basket open at the top, in which the worm lies when it is not feeding. Sometimes two worms unite in forming and occupying one of these baskets.

The HICKORY TUSSOCK MOTH larva, § 183, or a caterpillar very similar to it, is also sometimes found on the locust.

330. TITYRUS SKIPPER, *Eudamus Tityrus*, Fabricius. (Lepidoptera. Hesperidæ.)

The last of July, under a folded edge of a leaf when small, afterwards in two or more leaves drawn together in a kind of pod, a pale green worm with darker green bands, red neck and rough dull red head, 2.00 long when full grown; the pupa wintering in a slight cocoon coated outside with shreds of dead leaves; the middle of the following June giving out a dark brown butterfly with a yellow glossy band on the middle of its fore wings and a broad silvery white one narrowing outwardly, across the middle of the hind ones on their under side, its width 2.00. See Harris's Treatise, p. 243.

331. BLACK LOCUST MIDGE, *Cecidomyia Pseudacaciæ,* new species. (Diptera. Tipulidæ.)

In July and August, the tender young leafets near the tip of the stem folded together like a little pod, the cavity inside containing from one to three small milk-white maggots, which descend below the surface of the ground, remaining there in their pupa state about ten days, and then hatch a small blackish midge, the base of its thorax tawny yellow, its abdomen pale yellowish with the tip dusky and clothed with fine hairs as is the neck also, its legs black with the thighs pale except at their tips, its wings dusky, feebly hyaline, with the fringe short, its antennæ with thirteen short cylindrical joints separated by short pedicels, its length 0.065 to the tip of the body in the females, which is the sex now described.

Before the small young leafets, which put forth along the opposite sides of the main leaf stalks at their tips, become expanded, they are closed together like two leaves of a book; and it is probably at this time that the female midge inserts her eggs in the cleft between them, the irritation from which and from the small maggots which hatch from them, keeps the leafet permanently closed, a slight cavity forming within, in which the worms reside, the leafet hereby coming to resemble in its shape a small bivalve shell, of the genus *Chama*, the margin being usually more or less wavy. The surface remains unchanged outside, but within it assumes a pale greenish yellow color. The larvæ are milk-white and somewhat glossy, with a light green cloud along the middle of their bodies from alimentary matter internally in the viscera. When menaced with danger, they have the faculty of throwing themselves away with a sudden skip, the same as the larvæ of the Wheat midge. The attachment of the leafets to the stalk becomes so weakened when infested by these worms, that I presume they are generally broken off by the wind and the worms are thus carried to the ground, instead of crawling down the stalks by night as is the habit of the Wheat midge.

I notice these pod-like leafets every summer, upon the locusts in my yard, as well as the deformity produced by the following species; but neither of these insects have ever been so numerous as to injure the trees in any sensible degree, in my vicinity.

332. YELLOW LOCUST MIDGE, *Cecidomyia Robiniæ,* Haldeman.

In July and August a portion of the edges of the leaves rolled inwards on their under sides and thickened, inclosing one or two very small white maggots which are varied more or less with orange yellow; producing a pale orange midge with the sides of its thorax and often three oval stripes on the back and the wings dusky, its antennæ blackish and of fourteen joints in the females, twenty-four in the males, its length 0.12.

In midsummer the margins of many of the leafets of the locust may be noticed rolled inwards upon their under sides for a length varying from over a quarter to a half inch, the upper side showing a concavity or rounded hollow at this point. This rolled portion is changed in its color to a paler yellowish green, and its texture is thickened and succulent. The same leaf sometimes has two or more of these folds along different parts of its margin. The worm concealed therein is colorless-watery when young, becoming, as it approaches maturity, opake and milk-white varied more or less with bright yellow. It is long oval, broadest in the middle and tapering thence to a sharp point anteriorly, the opposite end being bluntly rounded, and is divided into thirteen segments by transverse impressed lines.

Prof. Haldeman, who described this species in Emmons's Journal of Agriculture and Science, October, 1847, says it, in conjunction with the following species, had been so numerous in south-eastern Pennsylvania, the two preceding summers, as to kill the leaves upon the locusts, the trees in August appearing as though they had been destroyed by dry weather.

333. LOCUST HISPA, *Anoplitis scutellaris*, Olivier. (Coleoptera. Hispidæ.)

In July, blister-like spots appearing upon the leaves, within which is a small flattened whitish worm, attaining a quarter of an inch in length, tapering from before backwards, with projections along each side like the teeth of a saw, and with only three pairs of feet, which are placed on its breast; eating the parenchyma and leaving the skin of the leaf entire; remaining only a week in its pupa state, in the leaf, and towards the middle of August, coming out therefrom a small oblong flattish beetle of a black color with the thorax and wing covers, except along their suture, tawny yellow, its length 0.25.

This is the *Hispa suturalis* of Dr. Harris, (Boston Journal of Natural History, i, 147, and Treatise on Injurious Insects, p. 107,) but cannot be the species thus named by Fabricius and Olivier, which is stated to have the head, under side and legs, yellow or testaceous. It is very plainly described by Olivier under the name *scutellaris*. Though the species is common in the southern part of New York, I have never met with it in the eastern section of the State, where the following which much resembles it in its habits and larva, is common.

334. FLATTENED LOCUST LEAF-MINER, *Anacampsis Robiniella*, new species. (Lepidoptera. Yponomeutidæ.)

In July, white blister-like spots on the under side of the leaves, occupying about a fourth of the surface or half the space on one side of the midrin, containing within a flattened pale green or whitish worm, tapering posteriorly, with a darker green streak along its middle; passing its pupa state in the leaf, which falls to the ground, and the following June gives out a minute moth 0.45 wide across its spread wings, which are blackish brown on their outer half, tawny yellow on their inner side, and marked with an oblique white band before the middle, a broad grayish white band or large triangular spot on the middle, and half way from this to the tip a white spot on the outer and a pale rose red one opposite it on the inner margin, and also a small white spot on the tip and on the base.

Of the seventeen small leaves or leafets which commonly form each compound leaf of the locust, usually two or three, and frequently double that number, show these white blisters on their under sides. And it is not rare to see two or three of them upon the same leafet, which usually turns yellow and drops prematurely from the tree, when thus severely invaded. But where it has only one insect preying upon it, it usually remains green and survives the attack. For of the two layers of parenchyma in the leaves, it is only the lower that is ate by these worms, the upper one being left entire, whereby the upper surface of the leaf remains green, or is but slightly discolored with a yellowish cloud at this place. The white separated skin of the under surface is very thin and delicate, so much so that frequently the worm may be perceived beneath it, sometimes feeding at the outer edge of the spot, but more commonly at rest towards its centre, or turning its head with a sudden spiteful jerk, first to one side and then to the other, being evidently aware that it is interfered with, and resorting to this motion to frighten away the intruder. And not unfrequently two worms are seen occupying the same cavity.

The LARVA when young and as found in the smaller spots, is of a very pale green or white color with a darker green or a pale brown streak along its middle. It is very much flattened, and is broadest anteriorly across its neck, gradually tapering from thence to the tip. It is divided into thirteen segments by deep transverse constrictions, giving it a serrated appearance along each side, and from the tip of each of the projecting teeth arises a short white hair. When full grown it measures 0.18 in length and then presents a somewhat different aspect, the middle of the body being now as broad or slightly broader than the anterior end, with the sutures more deeply impressed, and the projecting teeth along each side are rounded and not so angular at their ends as before, and are of a yellow color, at least those at each end. And now small retractile legs are perceptible, enabling the worm to move about with more facility than when it was young. There are three pairs of small conical watery-white legs placed on the three thoracic segments, and on the third, fourth and fifth abdominal segments is a pair of minute pro-legs, scarcely to be discerned except when the worm is crawling.

The pupa lies in a small, broad, oval cocoon, 0.18 long, and 0.12 thick, woven of exceedingly fine white silk, through the sides of which the insect within is seen, of a pale yellowish color. This cocoon is suspended near the centre of the cavity, by a few threads of fine silk, crossing irregularly in different directions; the cavity in the leaf having now become much more deep and spacious than when it was first mined by the worm. The manner in which nature has so adjusted her work, here, as to cause this cavity to grow more deep and roomy, is truly curious. We have already stated that it is only the lower layer of the parenchyma of the leaf on which this worm feeds. This being consumed from the mid-vein to the outer margin, the thin membrane of the under surface of the leaf which is hereby separated, loses its vitality and ceases to grow; whilst the upper layer of parenchyma, being uninjured, continues to expand. But the dead membrane on its under side holds it, like a bridle, from expanding further outwards, and it hence bulges upward, convexly. Thus the cavity in the leaf assumes the shape of an oven, its floor flat and its roof arched or concave. Thus ample room is furnished for the cocoon to be suspended, like a hammock, in the centre of the cavity.

Frequently, instead of the cavity in the leaf being occupied with a few fine threads supporting a cocoon in the centre, we meet with one or two smaller and much narrower snow-white cocoons, promiscuously placed. They are 0.12 long and a fourth as broad. In due time the ends of these cocoons are raised, like a lid, and a minute parasitic fly comes from them, the larva of which have subsisted upon and destroyed the larva of this leaf miner. It pertains to the family *Braconidæ*, and the genus *Microgaster*, and may be called

THE LOCUST LEAF-MINER PARASITE, *Microgaster Robiniæ*.—It is cream yellow or straw yellow, with the antennæ and legs pure white; the female being deeper yellow or orange, with the tip of the abdomen often dusky. Its wings are pellucid whitish, with colorless veins, the small central cellule being open on its hind side. The male is 0.07 long, and to the tip of its wings 0.11, its antennæ being 0.10.

335. SLENDER LOCUST LEAF-MINER, *Argyromiges Pseudacaciella*, new species. (Lepidoptera. Yponomeutidæ.)

In similar white blister-like spots, a much more slender worm, not flattened, very deeply constricted at the sutures and resembling a string of beads; producing a minute moth only 0.24 in width, its fore wings golden yellow with four white bands on their outer side, the forward ones oblique, broader and edged with black lines, and also three or four similar white bands on their inner side and a large black dot on their tip half encircled with whitish.

This larva occurs in the blister-like spots of locust leaves at the same time as the preceding, but is at once distinguished from it by its more slender form, very little tapering from before backwards, and not at all flattened. Its legs are also much larger and more distinct, showing three pairs anteriorly, three on the middle abdominal segments and one pair at the tip. A few soft hairs are scattered over its body. Its head is small and is sometimes wholly retracted within the neck. It is divided into twelve rings by very wide deep constrictions, giving to the worm a striking resemblance to a string of very small beads, usually of a watery whitish color with a brown line along the middle, but sometimes curiously diversified from internal alimentary substances in different stages of digestion. Thus a worm was in one instance noticed as having the three first rings white, the four following ones light green, the next, or eighth of the series, light yellow, the ninth and tenth pale brownish green, the eleventh blackish, and the last semi-transparent and like colorless glass—as though it were designed to imitate a string of beads of different colors. Its length when full grown is 0.18. The convex upper side of its cell forms a kind of fold or plait, in which the worm spins its cocoon, which is snow-white and more closely woven than that of the preceding species, and the pupa enclosed therein is of a darker or dusky color. A portion of these pupæ probably remain unhatched during the winter, lying in their burrows in the dead fallen leaves. Others give out the moths in autumn, and as cold weather comes on these delicate tiny creatures creep into the crevices under the loose scales of bark upon the trunks of trees, and similar situations, where they remain in a torpid state through the winter, and if so fortunate as to escape the notice of the spiders which hide themselves in the same places, they come abroad again upon the wing the following spring.

The genus *Argyromeges* of Mr. Curtis, to which this and two species on oaks described in the preceding pages pertain, comprises quite a number of very minute moths, as will be inferred from their larvæ occupying such a narrow space as half the thickness of leaves so thin as those of the locust. But what they lack in size is in many of the species compensated in the brilliancy of their colors and the prettiness of their adornment. Men have often exerted themselves to write the Lord's prayer or the decalogue within the compass of a sixpence, and it would seem that in these minutest kinds of moths as in many other insects Nature had aimed to show how much splendor and elegance she could include within the smallest limits. In this genus the fore wings are frequently of the most brilliant golden and silvery hues and marked with oblique streaks. They are narrow and rolled around the body when at rest. The hind wings are very narrow and fringed on both sides with long fine hairs. Their heads have a rough uncombed appearance from a tuft of dense erect and radiating bristles placed upon the crown.

This species is allied to *Klemannella* and other similar European moths of this genus in its colors and marks. Its fore wings are of a uniform brilliant golden color, with four silvery white triangular spots or bands on their outer half, which are bordered with black and are placed at nearly equal distances from each other, the anterior two being larger and placed obliquely and the others transverse. On the inner half of these wings are also three or four similar bands, the two last ones with their inner ends running into the ends of the two hind ones of the outer side. On their tips is a large black dot with a broad whitish border on its hind side, followed by a curved black band on the hind edge of the wing, beyond which comes the fringe which is of a smoky gray color. Often a longitudinal black indentation or short stripe occurs on the middle of these wings forward of the black dot and between the inner ends of the second and third bands. The hind wings are blackish with a smoky gray fringe. The legs are alternately banded with white and black.

I have sometimes met with numbers of these moths in their winter quarters beneath the large loose scales of bark on hickory trees, and at such a distance from any locust trees as to render it probable they had been nurtured in the leaves of some other tree, perhaps those of the hickory. Minute moths of several other species are met with, in company with them in this situation, some of them of this same genus and so closely resembling the locust leaf-miner that they merit a notice in connection with it, although I know not the kind of leaves in which they are reared.

336. Morris's leaf-miner, *Argyromiges Morrisella*, new species.

This moth is similar to the preceding in its size and marks, but the entire inner half of the fore wings is black, slightly tinged posteriorly with golden yellow, and interrupted at equal distances by three white spots or short bands narrowing towards their inner ends, and between each of these is a less distinct white spot or cloud. Forward of the anterior white spot the color is more pure and coal-black, forming an oblong square spot occupying the inner half the base of the wing, which spot is bordered along its inner side by a slender white stripe placed upon the middle of the wing at its base, its hind end uniting with the inner end of the anterior white spot.

337. Uhler's leaf-miner, *Argyromiges Uhlerella*, now species.

This resembles *Pseudacaciella*, but is throughout of paler colors, the fore wings being golden gray, with five white spots along their outer sides, of which the hindmost ones are small, the others quite large and bordered with blackish upon their anterior sides; and the black dot on the tip of the wings is here replaced by a short black stripe thrice as long as it is wide; whilst the hind wings and their fringes are pale silvery gray. These marks will suffice to distinguish this from the two preceding species.

333. Ostensacken's leaf-miner, *Argyromiges Ostensackenella*, new species.

Another moth of this genus, which comes abroad in July and August and sometimes enters opened windows in the evening, alighting around the lighted lamps upon our tables, I here introduce to notice, it having much similarity to those above described. Its body, hind wings and all the under side is black, its head silvery white, and its fore wings of a deep orange tint with the brilliancy of gold. These wings are crossed by four equidistant straight broad silvery white bands, each edged on its fore side with a black line, the second of these bands being placed in the middle of the wing and the two hind ones having an interruption in their middle. There is no black dot on the tips as in the preceding species, but on their hind edge is a curved black line. Its width when the wings are spread is but 0.20.

Numerous other leaf-mining moths of our State pertaining to this and kindred genera are known to me, some of them rivalling or surpassing the preceding in their highly burnished metallic colors and the elegance of their marks, but as they have less resemblance to the Locust leaf-miner, there is no occasion for a particular notice of them in this connection.

LOCUST. LEAVES.

339. Say's weevil, ***Apion Sayii***, Schonherr. (Coleoptera. Attelabidæ.)

From June till September, eating numerous small round holes in the leaves, a little black weevil with a slender projecting beak, its thorax with close coarse punctures and an oval or longitudinal indentation back of its centre, and the furrows of its wing-covers with coarse punctures, its length 0.09 and to the end of its beak 0.12.

This species is common throughout the United States and is perhaps the most numerous of any beetle of the weevil kind which we have in our country, but being so very small it is seldom observed. It probably breeds in the seeds of the locust and of various other species of the Natural Order *Leguminosæ*, Dr. Harris having met with it in all its stages in the seeds of the Baptisia or wild indigo. It would be regarded with confidence as forming two or three distinct species were specimens in the cabinet alone examined. Thus, among a number of individuals taken upon the leaves of the locust, some will usually be met with in which the indentation back of the centre of the thorax is round and appearing like an impression made by the head of a pin, instead of being oval or oblong. And in others this indentation is prolonged, forming a small furrow along the middle of the thorax its whole length. It is quite customary at the present day to regard all such differences in the sculpture of beetles as sufficient characters by which to separate them into distinct species. We however cannot but deem that a large portion of the species which are thus founded will eventually be discovered to have no valid existence in the domain of nature.

340. Two-spotted tree-hopper, ***Thelia bimaculata***, Fabricius. (Homoptera. Membracidæ.)

In September, puncturing the twigs and sucking their juices, a brown triangular tree-hopper 0.50 long and having a form analagous to that of a beech-nut, with a long horn running obliquely forward and upward overhanging the head and compressed and rounded at its end, a large oblong bright yellow or dull gray spot on each side, widening anteriorly, its thorax as long as the wings, sharp-pointed at its tip and with elevated lines posteriorly.

I have never met with this species north of Albany, although it is not rare in the southern part of this State and of New England, and extends from thence through the southern and south-western States.

The **Buffalo tree-hopper**, § 21, is also common upon the locust, stationing itself in the axilla or angle where the leaf stalk arises from the limb. In August, upon the green succulent twigs it is not rare to find one of these tree-hoppers thus stationed, at the base of almost every leaf.

3. THE ELM—*Ulmus Americana et fulva.*

AFFECTING THE TRUNK.

341. Trident Saperda, ***Saperda tridentata***, Olivier. (Coleoptera, Cerambycidæ.)

Consuming the inner bark of the slippery elm, (*Ulmus fulva*,) in decaying and dead trees, a white grub about half an inch long, slightly tapering and with strongly constricted sutures dividing it into twelve rings, of which the first is largest and has a flattened tawny space above covered with minute rust colored dots; its pupa lying in an oval cavity in the bark and the latter part of May coming out, a cylindrical blackish long-horned beetle with an orange yellow or red stripe along each side of the body, which on the wing-covers sends three equidistant branches inward towards the suture, the two hind ones oblique, its length 0.38 to 0.55.

Where the slippery elm trees are killed, as they all are in my own vicinity, by having the bark peeled from around their trunks for medicinal purposes, the remaining bark immediately becomes filled with these worms, by which all its inner layers are consumed within a few months and changed to worm-dust. The beetle deposits its eggs upon the bark in June, and the young larvæ therefrom nearly complete their growth before winter, and soon after warm weather arrives the following spring they pass into their pupa state.

The LARVA when mature is about 0.55 long and 0.12 broad across the anterior end where it is broadest and slightly tapers from thence backward. It is divided into twelve segments in addition to the head, separated from each other by deep wide constrictions, the last segment being double or having a small additional segment received into its apex. Along the middle of the back is an impressed line or furrow. It is of a white color and clothed with fine short hairs. Its head is tawny yellow and sunk into the neck, the jaws black and slightly notched at their tips or two-toothed. The neck or first ring is the longest one in the series and has a flattened space on its upper side of a tawny tinge and covered with numerous minute rust-colored points but showing no impressed line along its middle, and on its under side in the middle is a faint transverse oval spot with similar rusty dots, and upon each side is a shining impressed crescent-shaped spot of a tawny tinge. The two segments following this are shorter than those beyond them.

The surface of the beetle is occupied with small punctures from which numerous fine short hairs arise, which stand erect. This surface is of a glaucous grayish tinge, and on each side of the thorax below the orange stripe are two black dots. All the specimens which I have seen from the southern part of the State have an aspect so different from those of my own vicinity, that in the collections of amateurs they may frequently be noticed arranged as distinct species. They are of a darker livid gray hue, and their marks are dark orange red, instead of ochre or orange yellow, and on the wing-covers these marks are more prolonged, the middle one extending to the suture. This may be named the Red-marked (*rubronotata*) variety.

Another variety is sometimes seen, in which the branches from the lateral stripe upon the wing-covers are of a gray hue, and so very faint that they are scarcely perceptible. This may be named the Intermediate, (*intermedia*,) it being so slightly different from the following species as to excite doubts whether it is a hybrid produced by a crossing of these two species, or whether these insects are not in reality one species, varying merely from being reared in different species of the elm.

342. LATERAL SAPERDA, *Saperda lateralis*, Fabricius.

Mining the inner bark of dead trees and logs of the common elm, a grub in every respect the same with that last described above, and about the first of June producing a similar beetle, differing in being destitute of the transverse bands branching from the lateral stripe upon the wing-covers, its length varying from 0.35 to 0.55.

Two varieties of this beetle may be noticed, the one (*abbreviata*) having the stripe along the outer side of the wing-covers narrow and not extending to their tips, the other (*suturalis*) showing a slender orange colored line along the inner edge of the wing-covers their whole length.

343. SIX-BANDED DRYOBIUS, *Dryobius, 6-fasciatus*, Say. (Coleoptera. Cerambycidæ.)

A similar but larger worm than the preceding, found in the same situation, producing a black beetle of similar form, with the margins of its thorax yellow, and also its scutel and four equidistant oblique bands on its wing-covers, the last one placed on their tips, its length about 0.70. This species is exceedingly rare, but probably occurs in all parts of the Union.

The ELM BARK-BEETLE, § 60, produces small pin-hole perforations in the bark; and the PIGEON TREMEX, which will be described under the Maple, bores in the wood of this tree.

AFFECTING THE LEAVES.

Quite a number of different worms are met with upon the elm, eating its leaves; but nearly all of these are oftener seen upon other trees, under which their description more properly belongs, and to most of them has already been given. A word or two as to the general appearance of these is all that will be required in this place.

Of *large thick-bodied worms*, there is found on this tree

The POLYPHEMUS MOTH larva, § 181, of an apple green color, with bright orange points and a row of oblique pale yellow stripes along each side.

The IO EMPEROR MOTH larva, § 81, apple green, with branching prickles and a brick red or orange stripe along each side.

The ASH SPINX (*Sphinx quadricornis*) larva, a cylindrical green worm with a pale blue or green horn at the end of its back. See Ash insects.

The AMERICAN CIMBEX larva, a cylindrical glaucous yellowish white worm, coiled like a snail's shell and having two black lines along its back; much more common on willows, under which it will be described.

Of more *slender bodied thorny worms* there are

The WHITE-BORDERED BUTTERFLY larva, black, with a row of rust-red spots on the back, and more often met with on willows, which see.

The PROGNE, § 142, and the WHITE-C. BUTTERFLY, § 143, similar but paler colored worms.

Of *hairy-bodied caterpillars* there are

The FALL WEB WORM, § 81, in cobweb-like nests the latter part of summer.

The VAPORER MOTH larva, § 32, with pencils of long black hairs, and on its back short yellow brush-like tufts.

ELM. LEAVES.

Of *measure worms*, having but ten feet, there are

The CANKER WORM, § 38, the V-MARKED MEASURE WORM, § 39, and the NEW YORK MEASURE WORM, (*Erannis subsignaria*, Hubner,) which has been so noted a pest for many years in the metropolis of our State, and is most destructive to the lindens, under which the description of it will be given.

Of worms which are peculiar to the elm, or are more common on this than other trees, there are several, which are not yet known to me in their perfect state, and I have but one species to present at this time. This is an inhabitant of northern Europe, and has not been known hitherto as occurring also upon this continent.

344. NOVEMBER MOTH, *Oporabia dilutata*, Schifferrmyller. (Lepidoptera. Geometridæ.)

Feeding on the leaves in spring, a dirty green measure worm, beneath paler bluish white, its breathing pores forming a row of orange red dots along each side, where is sometimes a yellow line also; living openly exposed upon the leaves and in the summer entering the ground to pass its pupa state; the moth coming out in November, its wings usually as thin as bank note paper and semi-transparent, very pale gray, the fore pair with faint indistinct transverse marks of a darker color, whereof two near to and parallel with the hind edge are commonly the most distinct, and two others extending from the middle of the inner margin to a small dusky streak in the centre of the wing, the hind wings fringed all around with whitish hairs. Width about 1.30.

Slowly flying among the leafless bushes upon mild days in November I have met with this moth. It coincides so perfectly with the figures and accounts given of the European November moth, as it is termed in English works, that I cannot deem it anything else than the same species. A more accurate representation of my specimens could scarcely be made, than is the figure of the pale variety of this species, in Westwood and Humphrey's British moths. It is often more fully and distinctly marked, according to the statements of authors, than in the specimens from which the above description was taken. So extremely variable is it, that nearly a dozen species have been made from its varieties, by different writers.

345. LADDER CHRYSOMELA, *Chrysomela, scalaris*, Le Conte. (Coleoptera. Chrysomelidæ.)

Feeding upon the leaves throughout the season, a shining hemispherical bottle green beetle with silvery white wing-covers, on which are several bottle green spots and a broad jagged stripe on their suture, its wings rose red and its antennæ and legs rusty yellow. Length 0.30 to 0.40. Common also upon willows.

346. ELM GALERUCA, *Galeruca Calmariensis*, Linnæus. (Coleoptera. Galerucidæ.)

An oblong oval beetle 0.25 long, of a grayish yellow color with three small black spots on its thorax, a broad black stripe on the outer part of its wing-covers and a small oblong spot near their base, though originally named by Linnæus from a small seaport town of Sweden, is common over the chief part of Europe, feeding upon the leaves of the elm, to which it is sometimes very destructive. It has been introduced from thence into this country, and on its first appearance in the city of Baltimore some twenty years ago, it and its larvæ, which are thick cylindical blackish six-footed grubs, wholly denuded the elms of their leaves, for several successive seasons.

The following incident, verbally communicated to me by the Rev. John G. Morris, D. D., of Baltimore, merits to be related in this connection, it being one of the prominent popular errors prevailing in our country with respect to insects, to regard them as a unit, all alike in their nature and habits, and hence, if a remedy is discovered to be efficacious against one particular insect, the experimenter at once concludes, with the fullest confidence, that it will be similarly efficacious against all other insects.

Soon after this beetle commenced its destructive career in Baltimore, a representation of the evil was communicated to one of the most eminent and justly distinguished men of science in our country, with a request that he would inform them of some remedy for it. He, not being versed in this particular branch of Natural History, inferred the insect to be the Canker worm, which had not long before made very similar havoc upon the elms in his own neighborhood; and he accordingly replied, informing them that if they would surround the trunks of their trees with collar-like troughs and keep these filled with fish-oil, he doubted not they would find it an effectual remedy. With much care and at some expense this measure, coming from such a respectable source, was extensively resorted to. But they soon learned that what is sauce for the goose is not always sauce for the gander, or in other words, that what is an effectual remedy for one insect on elms is not equally efficacious for all other insects upon the same tree. As some had predicted who had informed themselves of the habits of this beetle, the protected trees received not the slightest benefit from this measure.

The GRAPE-VINE FLEA-BEETLE, § 128, a very small greenish-blue or purple jumping beetle, and the GOLDSMITH-BEETLE, § 57, a large shining lemon yellow beetle, also inhabit the elm, eating the leaves.

347. ELM GALL-LOUSE, *Byrsocrypta Ulmicola*, new species. (Homoptera. Aphidæ.)

In June, an excrescence or follicle like a cock's comb, arising abruptly from the upper surface of the leaf, usually about an inch long and a quarter of an inch high, compressed and its sides wrinkled perpendicularly and its summit irregularly gashed and toothed, of a paler green color than the leaf and more or less red on the side exposed to the sun; opening on the under side of the leaf by a long slit-like orifice; inside wrinkled perpendicularly into deep plaits and occupied by one female and a number of her young, some of which are often strolling outside upon the under surface of the leaf, minute oval yellowish white lice 0.02 long, with blackish legs, the female more or less coated with white meal on her back, 0.07 long, oval and pale yellow with blackish legs and antennæ. Though I have not yet met with winged individuals, they in all probability pertain to the genus to which I have referred this species above. The galls may frequently be noticed on elm leaves. By the middle of summer they become tenantless, dry and hard and of a blackish brown color.

4. THE POPLAR—*Populus grandidentata, etc.*

AFFECTING THE TRUNK.

348. **Broad-necked Prionus,** *Prionus laticollis,* Drury. (Coleoptera. Cerambycidæ.)

In the wood of the trunk and roots of different poplars, a white soft grub as thick as one's thumb and otherwise similar to that of the Chestnut-brown or Pennsylvania Prionus, § 234*; producing an oval moderately convex black long-horned beetle 0.90 to 1.50 long and less than half as broad, its wing-covers rough from confluent irregular punctures and with two or three raised lines, its thorax with three irregular teeth along each side, and its antennæ of twelve joints resembling little conical cups placed one within the other and projecting upon their lower side like the teeth of a saw; appearing abroad in July.

349. **Poplar-borer,** *Saperda calcarata,* Say. (Coleoptera. Cerambycidæ.)

Beneath the bark and in the interior of the wood boring a hole 0.45 wide and less than half as high, a yellowish white footless grub 1.75 long, slightly tapering and divided by strong constrictions into twelve rings, the first one largest and with its upper side flattened, tawny and slopeing forwards, and in all other respects resembling the Apple-tree borer, § 2; passing its pupa state in the tree and coming out in August and September, a pale bluish gray long-horned beetle, about an inch long and a fourth as broad, finely dotted with black, its scutel ochre yellow and also three stripes on its thorax and several spots on its wing-covers. See Harris' Treatise, p. 93.

AFFECTING THE LEAVES.

350. **White-S Clostera,** *Clostera albosigma,* Fitch. (Lepidoptera. Notodontidæ.)

Early in July, eating the leaves and reposing in a cavity formed of leaves drawn together like a ball, a large black caterpillar with white and yellow dots and stripes and a hump on the back of its fourth and eleventh rings; its pupa lying in a cocoon attached among the leaves, and in ten days giving out the moth the latter part of July; the moth grayish-brown, its fore wings crossed by three faint paler streaks, the two first parallel, the hind one with its outer half silvery white and strongly waved in the shape of the letter S; width 1.50. See Transactions, 1855, p. 506.

---

* Since my last report was in print I have ascertained that the fifth volume of Degeer's work was not published till 1775. Forster's name of this insect consequently has the priority, and **Chestnut-brown Prionus,** *Orthosoma brunnea,* Forster, should be substituted for the name I have in that place given.

POPLAR. LEAVES.

351. AMERICAN CLOSTERA, *Clostera Americana*, Harris.

Consuming the leaves in summer, a pale yellow caterpillar with two little black warts close together on the back of its fourth and eleventh rings, three slender black lines on its back and three in a broad dusky stripe along each side; its pupa passing the winter in a cocoon under leaves or rubbish on the ground; the middle of June giving out a pale grayish moth more or less varied with brown, its fore wings with three whitish bands, the first transverse and dislocated, the second oblique and giving off a transverse branch from its middle which runs to the inner margin uniting with the third band, the two thus forming a letter V, a faint whitish band across the middle of the hind wings; width about 1.35. See Harris' Treatise, p. 334.

The *Clostera suffusa* of Stephens was very probably described from a specimen of this species which found its way accidentally into the collection from whence he obtained it. Our moth shows a whitish spot or stigma near the center of the fore wings, this spot being sometimes dusky in its middle, as represented on the left side in Stephens' figure. Were the first band in this figure dislocated with its outer half carried somewhat towards the base of the wing, and the pale shade across the middle of the hind wings less angularly bent, all doubts upon this subject would be removed.

352. V-MARKED CLOSTERA, *Clostera vau*, new species.

A moth which is very similar to the preceding, but darker colored and smallar, with the bands more slender and distinct, may be readily distinguished from that species by its having the first band not dislocated but in its middle strongly curved backwards, the apex of the curve usually forming an acute point. The last band also is much more strongly undulated near its outer end, curving backwards almost in a semicircle, and is of a much more vivid white color, and broadly bordered on its hind side with bright rust-red. Its hind wings also are destitute of the paler band across their middle. Its width is about 1.20.

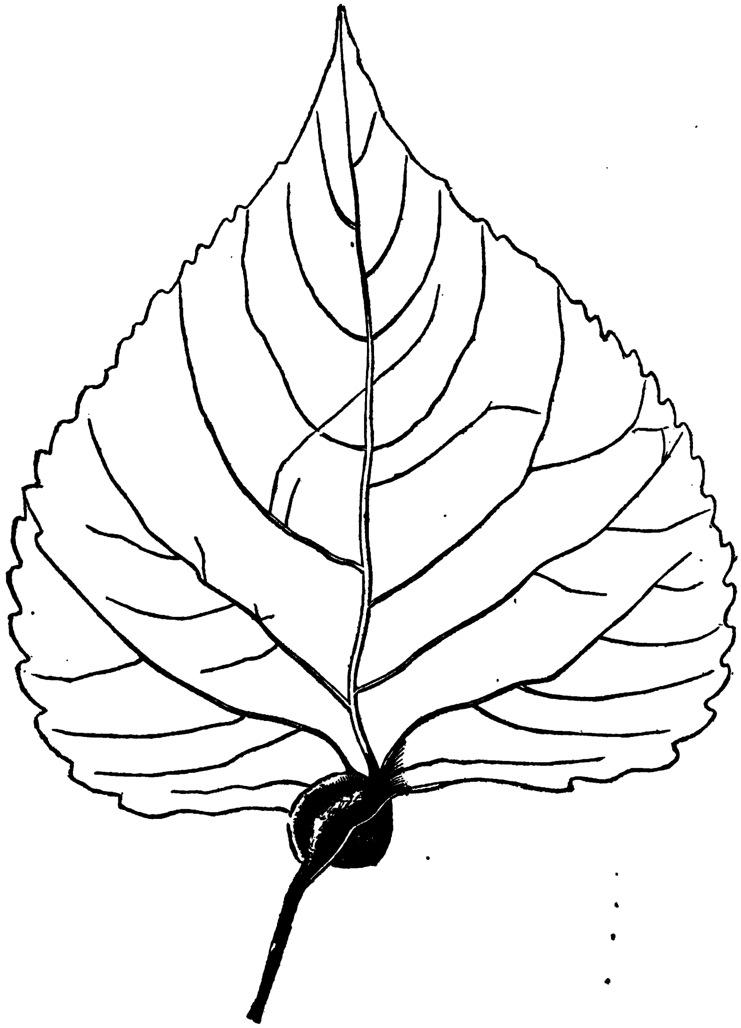
I am unacquainted with its larva, but like the other species of this genus, it doubtless feeds on the poplars and willows. Though quite rare in my own vicinity, it is oftener met with than the two other species.

Other worms feeding on the leaves of poplars are larvæ of the IO EMPEROR moth § 81, the WHITE-BORDERED BUTTERFLY, oftenest met with on willows, the NEW YORK MEASURE-WORM more attached to the linden, and others which are yet unknown in their perfect state.

353. POPLAR-STEM GALL-LOUSE, *Pemphigus Populicaulis*, new species. (Homeptera. Aphidæ.)

Forming imperfectly globular galls the size of a bullet at the junction of the leaf with its stalk, these galls having a mouth-like orifice on their under side, and a large cavity within, crowded with small dull white lice and their white cast skins, and with winged lice of a blue black color, their antennæ reaching beyond the base of their wings, the rib-vein of their fore wings black, thick, much thicker at its apex along the inner margin of the stigma-spot, and the short veinlet bounding the anterior end of this spot more slender than the rib-vein; its length 0.10, and to the tips of its wings 0.15.

This insect is attracting much notice in the city of Albany at the time these pages are passing through the press. The latter part of June, an article appeared in one of the daily papers of the city, directing attention to the remarkable phenomenon presented by the poplars in a particular yard on the opposite side of the river in Greenbush, most of the leaves having at their base a little ball filled with insects. Several of the leaves of these trees were kindly procured and forwarded to me by L. A. Orcutt, Esq. Visiting the city personally a fortnight after, I was informed the



same bullet-like excrescences were then growing on the poplars everywhere in and around the city, and were so numerous on particular trees that scarcely a leaf could be found which was destitute of them. The specimens shown me were taken from the River poplar or Cotton tree, (*Populus lævigata*, Aiton.)

Three years since, on the twenty-seventh of June, a leaf which had fallen from a Lombardy poplar in my yard, was found wilted and somewhat shrivelled, which showed on the middle of its stalk, a bullet-like gall, of which, and the insects within it, full memoranda were taken, which describe these Albany leaves perfectly; and when the leaves fell from this tree in autumn, a few were found among them, more faded than the others and having these same excrescences, but placed at the base of the leaf instead of on the middle of its stem, and the galls having now become black, dry and hard.

These excrescences are about a half inch in diameter and somewhat more long than thick. They are of a pale green color, similar to that of the stalk on which they grow.. At their base they are wrinkled with parallel plaits running from the excrescence a short distance downwards upon the stem on which they grow, which stem is slightly thickened at this point. On their upper side the surface is rough from numerous small smooth elevations resembling pimples, some of them round, others oblong, which are green at first, but soon become whitish and remain of this color after the gall is dead and black. They are of a weak leathery texture, having a large cavity inside, the walls being the thickness of thin leather. The cavity within is completely filled with a confused mass of little lice, sprinkled over and obsured by a white meal-like powder, and intermingled with them are a multitude of white shrivelled cast skins. These lice when more particularly examined, are found to be of three different kinds, namely, larvæ, pupæ, and perfect or winged flies. In the first gall which I inspected more than a hundred and fifty of these insects were counted.

The LARVÆ, or smallest insects in these galls, are about 0.03 long, but variable in size. They are of a dull white color with the knees a little dusky and the eyes blackish. They are oval, slightly narrower anteriorly, with their sutures well marked by transverse impressed lines.

The PUPÆ are similar to the larvæ in color and form, but of a larger size, and particularly distinguished by having little oval scales, which are the wings in their rudimentary state, pressed against each side of the body. Their feet as well as their knees are dusky, of a much darker shade in some than in others, and in some individuals the head and thorax have a reddish tinge. Their length is about 0.07. These were far the most numerous individuals in the gall first examined.

The WINGED FLIES are of a blue black color throughout, sometimes with the base of the abdomen and of the legs dull brownish yellow, and when newly hatched the under side or even the whole of the abdomen is dusky lurid greenish. The wings are closed together horizontally upon the back before the fly has left the gall, but after it has used them, they are held together above the back in a steep roof. They are whitish hyaline, not clear, being like the body so dusted over and dimmed with white meal-like powder that they appear almost opake until this extraneous matter is brushed off. The vein forming the outer margin is coarse and blue-black from the base to the commencement of the stigma, and very fine and slender beyond that point. The rib-vein also has the same color and is still more thick and coarse till it reaches the stigma, where it is widened to twice its previous thickness, forming a broad blue-black margin along the inner side of the stigma to its tip, whilst the branch running to the outer margin and bounding the anterior end of the stigma is much more fine and slender. The stigma is dull whitish and much more opake than the rest of the wing. It has an elliptic outline, its length about double its width and slightly wider than the space forward of it between the rib-vein and the outer margin. The oblique veins are pale yellowish and towards their tips slightly thicker and dusky. Around the origin of the two first a slight duskiness is perceptible upon the inner side of the rib-vein. The first oblique vein is straight. The second arises almost in contact with it, and is straight till near its tip, where it perceptibly curves towards the inner margin. The third vein is abortive or invisible through the first fourth of its length. The fourth, which arises from the middle of the inner side of the stigma, at first slightly approaches the third vein and then curves gently towards the outer margin, and at its tip bends again in the opposite direction. Its tip is somewhat nearer the tip of the third vein than this is to the second, the tips of the first and second being still more distant from each other and about the same distance that the tip of the fourth is from that of the rib-vein. The antennæ are rather thick and thread-like. The body varies in length from 0.08 to 0.10, but to the tip of the wings it is more uniform, measuring 0.15. These individuals are winged females, producing larvæ of a pale yellow color.

Galls analagous to those here described grow upon the leaf stalks of the Lombardy and the Black poplar in Europe, from the attacks of the *Pemphigus bursarius* of Linnæus ; but I judge our insect to be different from that, from specimens of the fly and its gall received from Dr. Signoret, and the full description of it in its different stages given by M. Fonscolomb (Ann. Soc. Ent., France, x, 193), the fly being paler in its color, and its gall spirally coiled somewhat like the shell of a snail.

The manner in which these insects produce these galls on poplar leaves is described by Mr. Rennie in his Insect Architecture, and may here be repeated, as the process is no doubt the same in ours that it is in the European species.

Often when the galls are opened a single individual is noticed therein much exceeding any of the others in its size and destitute of wings. This is the female parent from which the whole brood in each gall is descended. After wandering about upon the limbs and leaves during the first period of her life, she becomes stationary at this point on the leaf stalk, occupied first in erecting a house for her shelter and protection and then rearing her family therein. As she turns herself around, she makes a number of punctures in the leaf-stalk with her sharp needle-like beak. The sap which issues from these wounds, by its exposure to the air becomes thickened and curdled, whereby a thick fleshy wall of a living vegetable substance grows up around her, intermediate in its texture as in its situation between the wood and the leaf, being softer than the former and harder than the latter. And by puncturing this at its summit, a further exudation of the sap occurs, whereby the wall closes together over her, thus forming a little globe the size of a pea, within which the insect is securely sheltered from birds and predaceous insects. If in want of food she has only to insert her beak in the side of her cell and suck therefrom the nourishment she requires. Her eggs are next strewed around upon the inner surface of this gall, although the cavity has only sufficient space to contain them and the parent. But the young insects hatching therefrom, puncturing and drawing their sustenance from the same surface, cause the gall to increase gradually in its size, in the exact ratio in which the family within grow to require additional room. I observed no orifice in the smaller galls; but when a portion of the inclosed insects have acquired wings and are ready to come abroad, a longitudinal slit is formed upon the under side of the gall, like a mouth with the lips closed, and the gall then has some similarity to a bivalve shell, as that on the European poplars has to a univalve. Through this orifice the flies coming out into the light of day, open their wings a few times to air and strengthen them, and then mount upon them and pass away. If two or three of the galls happen to be laid upon a table, on the adjacent window will soon be found a multitude of these flies which have been arrested in their flight outwards. As already stated, at least a portion of the flies which begin to issue from these galls the last of June, are females giving birth to living young instead of eggs. But their further history and in what state they pass through the winter and till another crop of leaves put forth for their accommodation yet remains to be investigated.

In some instances two females fix themselves at the base of the same leaf, whereby their galls grow into each other, making an excrescence of double the usual size, in which are two cavities and two orifices.

Secluded as these insects are within the tough leathery walls of these galls, they are but little molested by those numerous insect enemies whereby the forces of the Aphides are so often routed and infested vegetation is cleansed from these pests. In one instance, however, the larva of a lady-bird (*Coccinella*) was noticed standing like a vigilant sentinel at the orifice of a gall, occupying himself no doubt in seizing and devouring the flies one after another as they issued therefrom, before their wings had acquired the requisite suppleness to enable them to fly away.

Although the leaves at whose bases these galls grow retain a healthy vigorous aspect till after the insects have escaped, they are undoubtedly weakened from having such an amount of their juice drawn away for the support of these galls and the insects within them, and will prematurely wither and fall from the trees. And when these insects become so numerous as they at present are around Albany, the trees will be enfeebled by them. But as it is merely the leaf stems which they infest, the life of a thrifty tree will be jeopardized only by their continuance in force through a series of years, and that they will thus continue is not to be expected.

354. POPLAR GALL-LOUSE, ***Pemphigus Popularia,*** new species.

Late in autumn, wandering up and down the trunk of the Balsam poplar, a gall-louse closely like the preceding, but its abdomen green, its antennæ short, reaching but two-thirds the distance to the wing sockets, and the rib-vein of its wings not thicker along the inner margin of the stigma; its length 0.13 to the tip of its wings.

In connection with the Poplar-stem gall-louse I introduce this species, it is so very similar, although I know nothing of its habits, beyond the fact that it was noticed in great numbers upon a Balsam poplar, *P. balsamifera*, Linn., upon a warm sunny day in the middle of October, wandering up and down the trunk of the tree, in company with a species of Aphis. These were winged females, one of which was observed to extrude a small larva 0.02 in length, of a pale yellow color with watery white head and legs.

As noticed at that time, these flies were black, slightly dusted over with a glaucous gray powder; the abdomen dull green with a small coating of white flocculent wool, its opposite sides parallel and its tip abruptly rounded; the antennæ short, thick and thread-like; the wings dull hyaline, their rib-vein black and the oblique veins slender and blackish with the basal third of the third vein abortive and the fourth vein perceptibly thicker towards its base; and the small branch of the rib-vein bounding the anterior end of the stigma having nearly the same thickness with the rib-vein.

355. Poplar-bullet gall-louse, *Pemphigus Populi-globuli*, new species.

In July, on the leaves of the Balsam poplar slightly above their base, an irregular globular apple green gall the size of a bullet, projecting from the upper surface of the leaf, with a curved mouth-like orifice on the under side, the cavity within containing numerous small pale green and smaller dusky lice with the end of their bodies covered with short white cotton-like threads, and larger winged ones which are of a black color, with the abdomen dusted over with white meal and with thin white woolly fibres on the back, and their antennæ reaching the base of the wings, which are clear hyaline, their veins slender and white or colorless, except the outer marginal vein which is black to the end of the stigma, and also the rib-vein, which is much thicker at its apex; their length 0.07 and to the tip of the wings 0.11.

I find several galls of this kind on a Balsam poplar in my yard, at the moment of sending these pages to the press. That I might render the history of the preceding species more complete, I wanted to think I here had the same insect at its summer employment which I had previously met with in autumn after its work for the season was closed. But on placing the two side by side I see some differences between them, so slight that it may not be in our power to distingish them with any degree of confidence in preserved specimens in the cabinet, yet so palpable that I am compelled to regard them as distinct species. And as in the gall-flies on oaks so also in the gall-lice on poplars it would seem that Nature designed to show how closely alike she could make several of these minute insects, and then placed them in dissimilar galls that the observer of her works might be assured they were really different the one from the other.

These flies differ from those of *P. Popularia* in being uniformly a size smaller, with wings more clear and glassy, their veins more slender and quite colorless, the stigma less opake than in that and other species of these insects, and the rib-vein more thick where it bounds the inner margin of the stigma and especially at its apex. The oblique branch of the rib-vein bounding the anterior end of the stigma is more slender than the marginal vein.

The fourth oblique vein is slightly thicker at its base, where it is also a little dusky. The abortive basal third of the third vein is traced by a very slender line, which here appears to be more distinct than in any of the kindred species. The inner margin shows the same duskiness for a short distance at and forward from the tip of the first vein that is common to the insects of this family. The abdomen is dusted over with a white mealy powder, with a black band on the hind part of each segment from the absence of this powder.

The gall grows from the midvein of the leaf slightly above the point where it passes into the stem, instead of at or slightly below this point where the Poplar-stem gall first described is situated. And hereby this gall has a narrow portion of the base of the leaf below it. It grows either wholly upon the upper side of the leaf, or with a small portion protruding outwards from the under side. It is of a spherical form, but more or less irregular and with the surface uneven. It varies from a little over a quarter to a half inch in diameter, and is of a pale apple green color, sometimes with a deep carmine red cloud on the side most exposed to the light. Its walls are nearly a tenth of an inch thick and very juicy and brittle, but become, as in other galls, more dry, wilted, and leather-like when old. The midvein where the gall is situated becomes thickened and curved or otherwise distorted, and the orifice of the gall opening along its side partakes of this curve.

The winged flies are females, producing eggs of a dull wax color, the eyes of the inclosed larva appearing like two black dots near one end, as in other instances in this genus. These eggs hatch within a few moments after they are extruded. Before they leave the interior of the gall these flies are mostly of a pale lurid green color with the knees and feet dusky, and only the antennæ and the thickened tip of the rib-veins are then of the black hue which the body acquires after its exposure to the light. And after they have come abroad the under side of the abdomen often retains this same lurid green color.

365. POPLAR-VEIN GALL-LOUSE, *Pemphigus Populi-venæ*, new species.

In July an oblong compressed excrescence like a cock's comb, of a light red color varied with pale yellow, growing from the midvein of Balsam poplar leaves on their upper side with an orifice on the opposite under side; a cavity within containing a multitude of lice and their white cast skins, interspersed with a whitish meal-like powder; those with wings being black, with coarse thread-like antennæ reaching to the base of the wings, which, with their oblique veins, are pellucid and colorless, the coarse rib-vein being blackish and more thick at its tip along the inner margin of the stigma, and the vein of the outer margin being blackish and somewhat coarse from its base to the stigma; its length 0.05 and to the tip of the wings 0.08.

A number of these galls may sometimes be observed upon the leaves of particular trees. They are nearly semicircular and half as high as long, being usually over a half inch in length, with an uneven surface, their walls thick, brittle and succulent. They are commonly placed near the base of the leaf, but sometimes in its middle. Among the insects in the cavity inside may be found the larvæ, pupæ and perfect insects of both sexes, which sexes can be distinguished in all the stages of their growth by their colors, the females being dusky and the males dull green with whitish legs and antennæ. A single wingless individual, larger than any of the others in the gall, is the parent or at least the progenitor of the entire family. As an instance of the tenacity of life which insects possess in their pupa beyond any other period of their existence, it may be observed that a wingless female with a larva and a pupa of this species, having been attached with gum to a slip of card, the two first were noticed twenty-four hours afterwards dead and shrivelled to mere shapeless specks, whilst the pupa remained alive, plump and strong, actively engaged in efforts to break its feet from the dried gum wherein they were fettered.

The FEMALE LARVÆ are dusky on the body and legs, with a tuft of white flocculent cotton-like fibres projecting backward from the end of the body, and a coating of white mealy powder over the rest of the surface. They are quite small, measuring about 0.025 in length, straight along each side and slightly narrowing from behind forward.

The MALE LARVÆ are less numerous than those of the female and double their size. They are very pale dull green with whitish antennæ and legs, the feet sometimes slightly dusky. They are coated with white meal and tufted at the tip like the female, but their bodies are more tapering forward and show the impressed sutures quite distinct.

The MALE PUPÆ are oval with the head and first segment of the thorax narrower. They are dull pale green with the second segment of the thorax and the wing-scales paler and watery in their appearance, and the sutures of the abdomen less distinct than in the larvæ, which they slightly exceed in their size.

The FEMALE PUPÆ are dusky like their larvæ, with the wing-scales and the thorax between them of an obscure whitish or pale watery color.

The WINGLESS FEMALE, the parent of the colony, is as broad as long, measuring 0.04 to 0.05 in length, the hind end being usually concave or notched, and the abdomen elevated or humped in its middle, resembling that of some spiders. She is pale dusky with two rows of snow white, dots formed of a mealy or pruinose substance, along each side of the back, the dots of the inner row being more numerous. Her head is darker and her legs dull pale yellowish with the feet dusky.

As some of the gall-lice now described may every year be met with upon the poplars planted in the grounds around our dwellings, I have given a somewhat extended account of them, thinking some of the persons into whose hands this Report will come, will, with the aid thus furnished them, be curious to examine these insects, whose habits are in many respects so interesting and truly remarkable. In addition to those which have now been noticed, several other species of the Aphis family dwell more openly exposed upon the leaves and green twigs of our poplars. I refrain from presenting these and similar insects belonging to oaks and other trees, until I shall have re-examined them in their living state, and compared them with the figures in the beautiful Monograph of Koch, that I may assure myself more fully whether several of them be not, as I suppose them, identical with those occurring upon similar vegetation in Europe.

5. THE BIRCH—*Betula lenta, etc.*

AFFECTING THE LEAVES.

The several kinds of birch appear to be the least infested by insects of any of our forest trees of the deciduous class. This fact recommends them strongly to public favor as ornamental trees for parks and pleasure grounds, they being also easy of cultivation though rather slow in their growth. They probably owe their immunity from insects to the spicy essential oil which imparts to their bark so pleasant a flavor. I know of no borer in the wood or bark of the birch, and very few worms which feed upon its leaves. Occasionally the V-MARKED measure worm, § 39 has been noticed in this situation and two or three other larvæ of small moths whose perfect state is not yet known. A few insects which puncture the leaves and green succulent twigs to sip their juices and a single beetle eating the leaves, are, according to my observations, the only insects which are oftener met with upon birch than on other trees, and are therefore to be considered under this head.

357. TRIPLE-ROWED CRIOCERIS, *Syneta tripla*, Say. (Coleoptera. Crioceridæ.)

In May and the fore part of June, eating the leaves of this and various other trees, an oblong chestnut-brown and closely punctured beetle, with wing-covers usually pale dull yellowish except on their suture and their punctures forming about three rows between each of the three raised lines, its length 0.25 and about a third as wide. A common insect in our State.

358. VARIABLE LEAF-HOPPER, *Athysanus variabilis*, Fitch. (Homoptera. Tettigonidæ.)

Puncturing the leaves and succulent shoots and extracting their juices, from the middle of June till the middle of July, an oblong oval leaf-hopper of a sulphur yellow color, its wing-covers commonly with an oblique black stripe, their tips hyaline, its thorax and scutel often tawny yellow or black, its length 0.20.

This insect may every year be met with in numbers upon birch trees and also upon alders. It was once found literally swarming upon a white birch standing apart from other trees.

359. SMALLER LEAF-HOPPER, *Athysanus minor*, Fitch.

From the middle of June till the middle of August, a similar leaf-hopper to the preceding, but of a cinnamon color, including its face, and having a colorless hyaline spot on the middle of its wing-covers and a larger one on their tips, its length 0.18 to 0.20.

360. WINDOWED LEAF-HOPPER, *Athysanus fenestratus*, Fitch.

From the middle of June till the last of July, a leaf-hopper resembling the foregoing species, but with blackish wing-covers with similar hyaline spots and a smaller third one placed on the middle of the inner margin,

and its forehead black with a pale yellow band between the eyes, its length 0.20.

The SPRUCE LEAF-HOPPER § 282 is also frequent upon the birch, and a few additional species which are common to this and the hornbeam and alder may hereafter be noticed under these last. The BUTTERNUT TINGIS, § 193 is also common on birch leaves.

INDEX.

These three Reports, it will be observed, are paged separately—the printer having supposed they were to form three pamphlets instead of one volume. Hence the references in this Index are not to the pages, but to the sections, as these are numbered consecutively through the three Reports.

The scientific names are in italics, but in those instances in which the scientific has nearly the same orthography with the common name only one of them is here inserted.

Section.

Abbotii, Lophyrus, 275
Abbot's saw-fly, 275
abdominalis, Urocerus, 253
Abia, Cherry, 93
Abietis, Athysanus, 282
“ *Lophyrus*, 283
Abraxas Ribearia, 191
Acanthodis macrocerus, 215
Achemon Sphinx, 120
Acrydium, Latreillei, etc., 215
Actias Luna, 180
aculiferus, Leptostylus, 4
Acutalis dorsalis, 103
Alaus luscus, 11
“ *myops*, 10
“ *oculatus*, 9
albicollis, Dichelonycha, 280
albicornis, Urocerus, 252
albofasciatus, Phymatodes, 301
Alypia 8-maculata, 122
American Clostera, 351
“ currant borer, 134
“ “ moth, 141
“ forester, 121
“ lappet moth, 30
“ saw-fly, 274
“ timber-beetle, 298
“ vaporer moth, 32
“ white ant, 196
Americana, Clisiocampa, 28
“ *Clostera*, 351
“ *Gastropacha*, 30
“ *Procris*, 121
Americanus, Hylecætus, 298
“ *Lophyrus*, 274
Amilapis triplipunctata, 325
Amputating brocade moth, 138
amputatrix, Hadena, 138
Amyotii, Otiocerus, 110, 179
Anacampsis Robiniella, 334
Anisopteryx vernata, 38

Section.

Anomala, Light-loving, 129
“ Pine, 281
Anomala lucicola, 129
“ *Pinicola*, 281
Anoplitis scutellaris, 333
Anotia Burnetii, 112
“ *Robertsonii*, 113
“ *Westwoodii*, 111
Ant, American white, 196
“ Walnut, 157
Apate basillaris, 158
Apatura Clyton, 83
Aphis, Apple, 18, 19
“ Currant, 145
“ Hickory, 162
“ Larch, 288
“ Mouldy, 20
“ Peach, 63
“ Plum leaf, 68
“ Vine, 116
“ White-pine, 256
Aphis Mali, 18
“ *Malifoliæ*, 19
“ *Persicæ*, 63
“ *Prunifoliæ*, 68
“ *Ribis*, 145
“ *Vitis*, 116
Aphrophora parallella, 257
“ *4-notata*, 97
“ *Signoretii*, 98
Apion Sayii, 339
Apple Aphis, 18, 19
“ bark-beetle, 5
“ bark-louse, 15
“ Buprestis, 3
“ midge, 49
“ root blight, 1
“ Sphinx, 34
“ Thrips, 51
“ Tortrix, 40
“ tree blight, 17

INDEX.

Section.
Apple tree borer, 2
" " caterpillar, 28
" twig borer, 12
Areoda lanigera, 57
Argyrolepia Quercifoliana, 326
Argyromiges Clerckella, 328
" *Morrisella,* 336
" *Ostensackenella,* 338
" *Pseudacaciella,* 335
" *Querci-albella,* 328
" *Quercifoliella,* 327
" *Uhlerella,* 337
Arhopalus fulminans, 300
" *pictus,* 329
Arma bracteata, 25
" *grandis,* 24
" *modesta,* 101
" *spinosa,* 26
Arrhenodes septentrionis, 295
Aspidiotus Cerasi, 75
" *circularis,* 139
" *conchiformis,* 15
" *furfurus,* 54
" *Gossypii,* 16
" *Juglandis,* 188
Athysanus Abietis, 282
" *fenestratus,* 360
" *minor,* 359
" *variabilis,* 358
Atolmis tricolor, 213
Attacus Cecropia, 33
" *Promethea,* 80
Attelabus, Hairy, 208
Attelabus, pubescens, 208
aurea, Deiopeia, 214
aurulenta, Buprestis, 223
Backii, Dichelonycha, 206
bajulus, Hylotrupes, 238
Balaninus nasicus, 188
" *rectus,* 209
balteatus, Cerasphorus, 4, 152
Banded Saperda, 154
" tree-hopper, 176
Bark-beetle, Cedar, 284
" Elm, 60
" Fine-writing, 243
" Little, 245
" Pine, 244
" Wood-engraver, 242
Bark-borer, Quercitron, 303
Bark-louse, Cherry, 74
" Circular, 139
" Currant, 140
" Hickory, 160
basillaris, Apate, 158
Beautiful wood-nymph, 123
Beetle, Apple bark, 5
" Big-eyed snapping, 9
" Blinking snapping, 11
" Cedar bark, 284
" Elm bark, 60
" Goldsmith, 57
" Grape vine, 128
" May, 76
" Pear blight, 56
" Pine, 244, 246
" Purblind snapping, 10
" Violaceous, 77
Belted Cerambyx, 4, 152
Biarhiza nigra, 290
bicaudatus, Bostrichus, 12
bidentatus, Silvanus, 195
Big-eyed snapping-beetle, 9

Section.
bimaculata, Thelia, 340
binotata, Enchenopa, 190
bivittata, Saperda, 2
Black gall-fly, 290
" locust-midge, 331
" -backed tree-hopper, 103
" -calfed saw-fly, 94
" -legged Diraphia, 264
" -margined gay-louse, 171
" -necked gall-fly, 292
" -walnut Sphinx, 186
Blight, Apple-root, 1
" " tree, 17
" Hickory, 161
" Oak, 306
" Pine, 254
" -beetle, Pear, 56
Blind-eye Sphinx, 35
Blinking snapping-beetle, 11
Blistering-fly, Pear, 58
Bonelli, Caliscelis, 113
Borer, Apple tree, 2
" " twig, 12
" Grape-vine, 95
" Locust, 293, 329
" Oak, 293
" Peach, 59
" Pear, 52
" Poplar, 349
Boring Hylurgus, 247
Bostrichus bicaudatus, 12
Bot-fly, Emasculating, 210
Bound tree-bug, 100
Brachytænia Malana, 40
bracteata, Arma, 25
Brenthus, Northern, 295
brevicornis, Ceresa, 177
Bristly-necked Valgus, 216
Broad-necked Prionus, 348
Bruchomorpha dorsata, 114
brumalis, Boreus, 291
bubalus, Ceresa, 22
Bud-moth, Eye-spotted, 45
Buffalo tree-hopper, 22, 340
Bug, Bound tree, 100
" Horn, 6, 72
" Large green tree, 99
" Modest tree, 101
" Rose, 50
Buprestis, Apple, 3
" Divaricated, 71
" Golden, 223
" Harris' 222
" Liberated, 219
" Lurid, 156
" New-York, 220
" Orange-lined, 226
" Oregon, 221
" Punctulated, 228
" Spotted-winged, 225
" Tooth-legged, 302
" Tuberculated, 229
" Ultramarine, 224
" Virginia, 218
" Yellow-dotted, 227
Buprestis aurulenta, 223
" *lineata,* 226
" *maculipennis,* 225
" *ultramarina,* 224
Burnetii, Anotia, 112
Butterfly, Clyton, 83
" Glaucous, 78
" Irene, 212

INDEX.

Section.
Butterfly, Large yellow, 36
" Lintner's, 211
" Misippus, 82
" Niphon, 272
" Progne, 142
" Tityrus skipper, 330
" White-C., 143
Butternut scale-insect, 189
" Tingis, 193
" tree-hopper, 191
" wooly-worm, 194
Byrsocrypta Ulmicola, 347
Bythoscopus clitellarius, 69
" *Strobi*, 261

Calamorum, Diraphia, 265
Calamus Diraphia, 265
C-album, Vanessa, 143
calcarata, Saperda, 349
Calf tree-hopper, 23
Caliscelis Bonelli, 113
Callaspidia confluenta, 317
" *nubilipennis*, 318
" *Quercus globulus*, 312
Callichroma, Fragrant, 233
Callichroma suaveolens, 233
Callidium antennatum, 237
Callidium, Black-horned, 237
calligraphus, Tomicus, 243
Callipterus Caryellus, 167
" *Castaneæ*, 199
" *fumipennellus*, 170
" *maculellus*, 169
" *marginellus*, 171
" *mucidus*, 20
" *punctatellus*, 168
Calmariensis, Galeruca, 346
Canker worm, 38
Cantharis Pyrivora, 58
Capsus clavatus, 269
Capsus, Club-horned, 269
Capreolus, Lucanus, 6
carbonarius, Hylastes, 249
Carpocapsa Pomonella, 48
Caryæ, Eriosoma, 161
" *Formica*, 157
" *Lachnus*, 162
" *Lecanium*, 160
" *Lophocampa*, 183
" *Phlæothrips*, 165
" *Uroxiphus*, 174
Caryæfolia, Phylloxera, 166
Caryana, Ephippophora, 184
Caryellus, Callipterus 167
Castaneæ, Callipterus, 199
" *Phylloxera*, 200
" *Smilia*, 197
Caterpillar, Apple-tree, 28
" Forest, 321
Caty-did, Long-horned, 215
caudatum, Trochilium, 136
Cecidomyia Grossulariæ, 150
" *Pseudacaciæ*, 331
" *Robiniæ*, 332
Cecropia, Attacus, 33
Cecropia emperor moth, 33
Cedar bark-beetle, 284
Cerambyx, Belted, 4, 152
" Tiger, 151
Cerasi, Abia, 93
" *Aspidiotus*, 75
" *Selandria*, 92
Cerasifex, Lecanium, 74

Section.
Cerasivorana Lozotænia, 87
Cerasphorus balteatus, 4, 152
Ceratocampa imperialis, 271
" *regalis*, 182
Ceresa brevicornis, 177
" *bubalus*, 22, 340
" *taurina*, 33
Chærocampa Pampinatrix, 118
Chætochilus contubernalellus, 44
" *Malifoliellus*, 43
" *Pometellus*, 42
Chalcophora liberta, 219
" *Novæboracensis*, 220
" *Oregonensis*, 221
" *Virginiensis*, 218
chalybea, Haltica, 128
Chermes, Larch, 289
" Pine, 267
Chermes, 267, 289
Cherry Abia, 93
" bark-louse, 74
" scale insect, 75
" slug-worm, 92
" -eating Tortrix, 87
Chestnut gay-louse, 199
" leaf witherer, 200
" tree hopper, 197
Chestnut-brown Prionus, 348
Chinquapin, Figites, 320
Chinquapin oak gall-fly, 320
Chionea valga, 291
Chrysobothris dentipes, 302
" *femorata*, 3
Chrysomela, Cloaked, 27
" Ladder, 345
" Philadelphia, 278
" Pine, 279
Chrysomela, 278, 279, 345
Cicada, Dog-day, 73
Cicada septemdecim, 14
" *tibicen*, 73
Cicindela Johnsonii, 214
cinctiformis, Cixius, 178
cingulatus, Oneideres, 154
Circular bark-louse, 139
circularis, Aspidiotus, 139
Cixius cinctifrons, 178
" *colæpium*, 179
" *Pini*, 262
Cixius, Cloudy-tipped, 179
" Face-banded, 178
" Pine, 262
Clastoptera, Obtuse, 192
" Pine, 259
" Testaceous, 260
Clastoptera, 192, 259, 260
clavatus, Capsus, 269
Clear-winged Dryocampa, 324
Clisiocampa Americana, 28
" *silvatica*, 321
clitellarius, Bythoscopus, 69
Cloaked Chrysomela, 27
Clostera, American, 351
" V-marked, 352
" White-S., 350
Clostera, 350-352
Cloudy-tipped Cixius, 179
" -winged gall-fly, 318
Club-horned Capsus, 269
Clyton, Apatura, 83
Clyton butterfly, 83
Clytus flexuosus, 329
" *Robiniæ*, 329

INDEX.

Section.
Coal-black Hylastes, 249
Coccus Pinicorticis, 254
Codling moth, 48
colæpium, Cixius, 179
collaris, Hyphantria, 89
Columba, Tremex, 52
Commixed Leptostylus, 235
compar, Lophyrus, 277
Comrade Palmer-worm, 44
conchiformis, Aspidiotus, 15
concinna, Notodonta, 37
confluenta, Callaspidia, 317
coniferarum, Sphinx, 270
Conotrachelus Nenuphar, 70
Coquebert's Otiocerus, 108
Coryli, Telamona, 202
Corylifex, Lecanium, 201
Cossus, Locust, 293
“ Oak, 294
Cossus, Querciperda, 294
“ *Robinæ*, 293
Cotton scale insect, 16
Cratægi, Thelia, 21
Crepidodera violacea, 77
Crested locust, 215
Cricket, Flower, 132, 133
Crioceris, Triple-rowed, 357
cristatum, Acrydium, 215
Croesia Persicana, 62
crypticus, Glyptoscelis, 27
cunea, Hyphantria, 91
Curculio, 70
Currant Aphis, 145
“ bark-louse, 140
“ borer, American, 134
“ “ European, 135
“ “ Wild, 136
“ mite, 137
“ moth, 141
Cuterebra emasculator, 210
Cynips oneratus, 313
“ *Quercus-arbos*, 310
“ “ *-batatus*, 311
“ “ *-ficus*, 314
“ “ *-lana*, 316
“ “ *-pisum*, 319
“ “ *-tuber*, 309
“ *seminator*, 315

debilis, Goes, 299
Deiopeia aurea, 214
dentatus, Hylurgus, 284
dentipes, Chrysobothris, 302
Desmia maculalis, 126
Dicerca divaricata, 71
“ *lurida*, 156
“ *punctulata*, 228
“ *tuberculata*, 229
Dichelonycha albicollis, 280
“ *Backii*, 206
“ *elongatula*, 204
“ *linearis*, 205
“ *subvittata*, 207
dilutata, Oporabia, 344
Diraphia, Black-legged, 264
“ Calamus, 265
“ Spotted-winged, 266
“ Vernal, 263
Diraphia, 263-266
Discoidal Saperda, 153
divaricata, Dicerca, 71
Divaricated Buprestis, 71
Dog-day Cicada, 73

Section.
dorsalis, Acutalis, 103
dorsata, Bruchomorpha, 114
Dotted ermine-moth, 90
“ flower-cricket, 133
Dotted-winged gay-louse, 168
Drab moth, 25
drupiferarum, Sphinx, 65
Dry-leaf measure worm, 86
Dryocampa, Clear-winged, 324
“ Senatorial, 322
“ Spotted-winged, 323
Dryocampa, 322-324
Dryobius 6-fasciatus, 343
Dux, Acrydium, 215
Dynastes Tityus, 72
Dysphaga tenuipes, 155

Eight-spotted Forester, 122
Elaphidion putator, 305
Elongated forked-claw, 204
elongatula, Dichelonycha, 204
Elm bark-beetle, 60
“ Galeruca, 346
“ gall-louse, 347
Emasculating bot-fly, 210
emasculator, Cuterebra, 210
Emperor moth, Cecropia, 33
“ Io, 81, 329
“ Promethea, 80
Enchenopa binotata, 190
Enderces Pini, 236
Ephippophora Caryana, 184
Erannis Tiliaria, 39
eremicola, Osmoderma, 8
Eriosoma Caryæ, 161
“ *lanigera*, 17
“ *Querci*, 306
Ermine moth, Dotted, 90
“ Spotted, 91
“ Yellow-necked, 89
Erythroneura obliqua, 146
“ *tricincta*, 105
“ *Vitifex*, 106
“ *vulnerata*, 107
Eudamus Tityrus, 330
Eudryas grata, 123
“ *unio*, 124
Eumetopona ministra, 29
Eupogonius Pinivora, 234
European currant-borer, 135
Eurytoma lanulæ, 316
excæcatus, Smerinthus, 35
exitiosum, Trochilium, 59
Eye-spotted bud-moth, 45

Fabricii, Lophyrus, 276
Fabricius' saw-fly, 276
Face-banded Cixius, 178
Facetious Leiopus, 286
facetus, Leiopus, 286
fasciata, Telamona, 176
fasciatus, Graphisurus, 303
“ *Œcanthus*, 132
Feeble oak-borer, 299
femoralis, Diraphia, 264
femorata, Chrysobothris, 3
fenestratus, Athysanus, 360
Figites Chinquapin, 320
Fine-writing bark-beetle, 243
Fir-tree saw-fly, 283
Flata, Mealy, 148
Flattened locust leaf-miner, 334

INDEX.

Section.
Flea-beetle, Grape vine, 128
“ Violaceous, 77
flexuosus, Clytus, 329
Flower cricket, Dotted, 133
“ Striped, 132
“ White, 131
Forest caterpillar, 321
Forester, American, 121
“ Eight-spotted, 122
Forked-claw, Back's, 206
“ Elongated, 204
“ Green-striped, 207
“ Linear, 205
Formica Caryæ, 157
Four-bristled mite, 159
Four-spotted spittle insect, 97
Four-striped leaf-hopper, 173
Fragrant Callichroma, 233
Freckled leaf-hopper, 172
frontalis, Termes, 196
fulminans, Arhopalus, 300
fulvicollis, Philonix, 291
fulvoguttata, Trachypteris, 227
furfurus, Aspidiotus, 54

Galeruca Calmariensis, 346
Gall-fly, Black, 290
“ Black-necked, 292
“ Chinquapin oak, 320
“ Cloudy-winged, 318
“ Oak-apple, 317
“ “ -ball, 313
“ “ -bullet, 312
“ “ -fig, 314
“ “ -pea, 319
“ “ -potato, 311
“ “ -tree, 310
“ “ -tumor, 309
“ “ -wool, 316
“ parasites, 313, 316, 319
“ Wool-sower, 315
“ Yellow-necked, 291
Gall-louse, Elm, 347
“ Poplar, 354
“ “ -bullet, 355
“ “ -stem, 353
“ “ -vein, 356
Gartered plume, 127
Gastropacha Americana, 30
Gay-beard, Pine-eating, 234
Gay-louse, Black-margined, 171
“ Dotted-winged, 168
“ Chestnut, 199
“ Hickory, 167
“ Mouldy, 20
“ Smoky-winged, 170
“ Spotted-winged, 169
Geometra siccifolia, 86
Gigantic locusts, 215
Glaucous butterfly, 78
glaucus, Papilio, 78
Glyptoscelis crypticus, 27
“ *hirtus,* 279
Goes debilis, 299
“ *tigrina,* 151
Golden Buprestis, 223
“ Lithosia, 214
Goldsmith beetle, 57
Gooseberry midge, 150
“ moth, 149
Gordius Sphinx, 34
Gossypii, Aspidiotus, 16
grandis, Arma, 24

Section.
Grape leaf-louse, 117
“ vine borer, 95
“ “ flea-beetle, 123
Graphisurus fasciatus, 303
grata, Eudryas, 123
Gray oak-worm, 324
Gray-sided weevil, 296
Grossulariæ, Cecidomyia, 150

Hadena Amputatrix, 138
Hag moth, 85
Hairy Attelabus, 208
Half-red locust, 215
Haltica chalybea, 128
Harris' Buprestis, 222
“ Prionus, 240
Harrisii, Chrysobothris, 222
“ *Tragosoma,* 240
Hazelnut bark-louse, 201
“ tree-hopper, 202
Hickory Aphis, 162
“ bark-louse, 160
“ blight, 161
“ gay-louse, 167
“ leaf witherer, 166
“ shuck moth, 184
“ Thrips, 165
“ tussock moth, 183
hilaris, Pandeleteius, 296
hirtus, Glyptoscelis, 279
Hispa, Locust, 333
“ Pale, 144
“ Rosy, 47
Hispa suturalis, 333
Horn-bug, 6
“ Spotted, 72
Hyalophora Polyphemus, 181
Hylastes, Coal black, 249
“ Pine, 248
Hylastes, 248, 249
Hylecœtus Americanus, 298
Hylobius Pales, 250
“ *picivorus,* 251
Hylotrupes bajulus, 238
Hylurgus, Boring, 247
Hylurgus, dentatus, 284
“ *terebrans,* 247
Hyphantria collaris, 89
“ *cunea,* 91
“ *pictipupa,* 88
“ *punctata,* 90
“ *textor,* 88
imperialis, Ceratocampa, 271
inermis, Smilia, 64
inornata, Smilia, 198
instabilis, Orthosia, 41
Io emperor moth, 81, 329
Io, Saturnia, 81, 329
Irene butterfly, 212
Irene, Nathalis, 212
irroratus, Jassus, 172
Ithycerus Novœboracensis, 13

Jassus irroratus, 172
Johnson's Cicindela, 215
Juglandifex, Aspidiotus, 189
Juglandis, Aspidiotus, 188
“ *Selandria,* 194
“ *Smerinthus,* 186
“ *Tingis,* 193

Katy-did, Long horned, 215

INDEX.

Section.
Lachnosterna fusca, ... 76
Lachnus Caryæ, ... 163
“ *Laricifex*, ... 288
“ *Strobi*, ... 256
Ladder Chrysomela, ... 345
lanigera, Areoda, ... 57
lanulæ, Eurytoma, ... 316
Lappet-moth, American, ... 30, 84
Larch Aphis, ... 288
“ cheater, ... 287
“ Chermes, ... 289
Large green tree bug, ... 99
“ tree bug, ... 24
“ yellow butterfly, ... 36
Laricis, Planosa, ... 287
Laricifex, Lachnus, ... 288
Laricifoliæ, Chermes, ... 289
Lateral Saperda, ... 342
laticollis, Prionus, ... 348
Latreille's locust, ... 215
Leader locust, ... 215
Leaf-hopper, Four striped, ... 173
“ Freckled, ... 172
“ Oblique striped, ... 146
“ Saddled, ... 69
“ Smaller, ... 359
“ Spruce tree, ... 282
“ Three banded, ... 105
“ Variable, ... 358
“ Vine, ... 104
“ Vine-destroying, ... 106
“ White-pine, ... 261
“ Windowed, ... 360
“ Wounded, ... 107
Leaf-miner, Locust, ... 333, 335
“ Morris's, ... 336
“ Oak, ... 327, 328
“ Ostensacken's, ... 338
“ Uhler's, ... 337
Leaf-witherer, Chestnut, ... 200
“ Hickory, ... 166
Lccanii, Platygaster, ... 308
Lecanium Caryæ, ... 160
“ *Cerasifex*, ... 74
“ *Corylifex*, ... 201
“ *Juglandifex*, ... 189
“ *Persicæ*, ... 61
“ *Pyri*, ... 53
“ *Quercifex*, ... 307
“ *Quercitronis*, ... 308
“ *Ribis*, ... 140
“ *Vitis*, ... 96
Le Conte's saw-fly, ... 273
Lecontii, Lophyrus, ... 273
Leiopus, ... 286, 304
Leiopus, Facetious, ... 286
“ Oak, ... 304
Leptostylus, Commixed, ... 235
“ Prickly, ... 4
“ spotted, ... 187
Leptostylus aculiferus, ... 4
“ *commixtus*, ... 235
“ *macula*, ... 187
leucostigma, Orgyia, ... 32
Liberated Buprestis, ... 219
liberta, Chalcophora, ... 219
ligata, Pentatoma, ... 100
Light-loving Anomala, ... 129
liminaris, Tomicus, ... 60
Limenitis Misippus, ... 82
linearis, Dichelonycha, ... 205
lineata, Buprestis, ... 226
lineatum, Rhagium, ... 241

Section.
Lintnerii, Vanessa, ... 211
Lintner's butterfly, ... 211
Lithosia, Golden, ... 214
“ Three-colored, ... 213
Little bark-beetle, ... 245
Locust Cossus, ... 293
“ Hispa, ... 333
“ leaf-miners, ... 333, 335
“ midges, ... 331, 332
“ tree borers, ... 293, 329
Locusts, Gigantic, ... 215
“ Seventeen-year, ... 14
Lophocampa Caryæ, ... 183
Long-beaked nut weevil, ... 185
Long-horned Katy-did, ... 215
Louse, Apple bark, ... 15
“ “ leaf, ... 18
“ Butternut, ... 188
“ Cherry, ... 74, 75
“ Chestnut, ... 199
“ Currant bark, ... 139, 140
“ “ leaf, ... 145
“ Grape bark, ... 96
“ “ leaf, ... 116, 117
“ Hazelnut, ... 201
“ Hickory bark, ... 160, 162
“ “ leaf, ... 167, 171
“ Peach bark, ... 61
“ “ leaf, ... 63
“ Pear, ... 53, 54
“ Plum, ... 68
Lozotænia Cerasivorana, ... 87
“ *Rosaceaha*, ... 46
Lucanus Capreolus, ... 6
lucicola, Anomala, ... 129
Luna, Actias, ... 180
Luna moth, ... 180
Lurid Buprestis, ... 156
luscus, Alaus, ... 11
Lymexylon sericeum, ... 297
macracerus, Acanthodis, ... 215
Macrodactylus subspinosus, ... 50
Macroglenes Querci-oncrati, ... 313
“ “ *-pisi*, ... 319
macula, Leptostylus, ... 187
maculalis, Desmia, ... 126
maculipennis, Diraphia, ... 266
Malana, Brachytænia, ... 40
Mali, Aphis, ... 18
“ *Molobrus*, ... 49
“ *Phlœothrips*, ... 51
“ *Tomicus*, ... 5
Malifoliæ, Aphis, ... 19
Malifolicllus, Chætochilus, ... 43
Marbled Pine borer, ... 231
Marked Pine borer, ... 230
marmoratus, Monohammus, ... 231
materiarius, Tomicus, ... 246
May beetle, ... 76
Mealy Flata, ... 148
Measure worm, V-marked, ... 25
“ White spot, ... 325
mera, Ophiderma, ... 191
Metachroma 6-notata, ... 285
Microgaster Robiniæ, ... 334
Midge, Apple, ... 49
“ Gooseberry, ... 150
“ Locust, ... 331, 332
Mid-winter Boreus, ... 291
Miller, (see Moth.)
“ White, ... 125
minor, Athysanus, ... 359
Misippus butterfly, ... 82

INDEX.

Section.
Misippus, Limenilis, 82
Mite, Currant, 137
“ Four-bristled, 159
Modest tree bug, 101
modesta, Arma, 101
Moldy Aphis, 20
Molobrus Mali, 49
Monohammus marmoratus, 231
“ *notatus,* 230
“ *scutellatus,* 232
Morrisella, Argyromiges, 336
Morris's leaf-miner, 336
Moth, American currant, 141
“ “ lappet, 30, 84
“ “ vaporer, 32
“ Amputating brocade, 138
“ Cecropia emperor, 33
“ Codling, 48
“ Dotted ermine, 90
“ Eye-spotted bud, 45
“ Gooseberry, 149
“ Hag, 85
“ Hickory shuck, 184
“ “ tussock, 183
“ Io emperor, 81, 329
“ Luna, 180
“ November, 344
“ Pine emperor, 271
“ Polyphemus, 181
“ Promethea emperor, 80
“ Regal hickory, 182
“ Spotted ermine, 91
“ Unstable drab, 41
“ Velleda lappet, 31
“ Waved tussock, 69
“ Yellow-necked, 89
mucidus, Callipterus, 20
myops, Alaus, 10
“ *Smerinthus,* 79

nasicus, Balaninus, 185
Naso Robertsonii, 115
Nathalis Irene, 212
Nematus suratus, 94
Nenuphar, Conotrachelus, 70
New York Buprestis, 220
“ weevil, 13
nigra, Biarhiza, 290
nigricollis, Philonix, 292
Niphon butterfly, 272
Niphon, Thecla, 272
niveus, Œcanthus, 131
nivoriundus, Boreus, 291
Northern Brenthus, 295
notatus, Monohammus, 230
Notodonta concinna, 37
Novæboracensis, Chalcophora, 220
“ *Ithycerus,* 13
November moth, 344
Oak-apple gall-fly, 317
“ -ball parasite, 313
“ blight, 306
“ borer, Cossus, 294
“ “ Feeble, 299
“ -bullet gall-fly, 312
“ “ parasite, 313
“ Cossus, 294
“ -fig gall-fly, 314
“ leaf-miner, 327
“ -leaf Tortrix, 326
“ Leiopus, 304
“ pea gall-fly, 319
“ “ parasite, 319

Section.
Oak pill-gall-fly, 319
“ potato gall-fly, 311
“ pruner, 305
“ root gall flies, 290, 291, 292
“ scale insect, 307
“ spangles, 320
“ tree gall-fly, 310
“ tumor gall-fly, 309
“ wool gall-fly, 316
“ “ parasite, 316
“ worm, Olive gray, 324
“ “ Thorny, 323
“ “ Yellow-striped, 322
obliqua, Erythroneura, 146
Oblique striped leaf-hopper, 146
Obtuse Clastoptera, 192
octo-maculata, Alypia, 122
Œcanthus fasciatus, 132
“ *niveus,* 131
“ *punctatus,* 133
Olive-gray oak worm, 324
Oncideres cingulatus, 154
One-colored tree-hopper, 175
onerati, Pteromalus, 313
oneratus, Cynips, 313
opercularis, Trichetra, 67
Ophiderma mera, 191
Oporabia dilutata, 344
Orange-lined Buprestis, 226
Oregon Buprestis, 221
Oregonensis, Chalcophora, 221
Orgyia leucostigma, 32
Oribata quadripilis, 154
Orthosia instabilis, 41
Orthosoma Pennsylvanica, 234-348
Osmoderma, 7, 8
Osmoderma, Rough, 7
“ Smooth, 8
Ostensackenella, Argyromiges, 338
Ostonsacken's leaf-miner, 338
Otiocerus, 108-110
Otiocerus, Amyots' 110
“ Coquebert's, 108
“ Signoret's, 109

Painted Puppet, 88
Pale Hispa, 144
Pales, Hylobius, 250
Pales weevil, 250
pallida, Uroplata, 144
Palmer worm, 42
“ “ Comrade, 44
“ “ Tawny striped, 43
Pampinatrix, Chærocampa, 118
Pandeleteius hilaris, 296
Papilio glaucus, 78
“ *Turnus,* 36
parallella, Aphrophora, 257
Parallel spittle-insect, 257
Partner saw-fly, 277
Peach Aphis, 63
“ bark-louse, 61
“ Tortrix, 62
“ tree borer, 59
Pear bark-louse, 53, 54
“ blight beetle, 5, 56
“ blistering fly, 58
“ tree borer, 52
“ “ Psylla, 55
Pearl wood-nymph, 123
Pelidnota punctata, 130
Pelidnota, Spotted, 130
pellucida, Dryocampa, 324

INDEX.

Section.
Pemphigus Caryæcaulis, 163
" *Caryævenæ*, 164
" *Populariæ*, 354
" *Populicaulis*, 353
" *Populi-globuli*, 355
" *Populivenæ*, 356
" *Pyri*, 1
" *Vitifoliæ*, 117
Pennsylvania Prionus, 234, 348
Pennsylvanica, Orthosoma, 239
Pennsylvanicus, Rhaphigaster, 99
Pentatoma ligata, 100
periscelidactylus, Pterophorus, 127
Persicæ, Aphis, 63
" *Lecanium*, 61
Persicana, Cræsia, 62
Philadelphia Chrysomela, 278
Philampelus Achemon, 120
" *Satellitia*, 119
Philonix fulvicollis, 291
" *nigricollis*, 292
Phlæothrips Caryæ, 165
" *Mali*, 51
Phylloxera Caryæfoliæ, 166
" *Castaneæ*, 200
Phymatodes albofasciatus, 301
Phymatodes, White banded, 301
picivorus, Hylobius, 251
pictipupa, Hyphantria, 88
pictus, Clytus, 329
Pigeon Tremex, 52
Pine Anomala, 281
" bark beetle, 244
" beetle, White necked, 280
" blight, 254
" borer, Marbled, 231
" " Marked, 230
" " White scutelled, 232
" Chrysomela, 279
" Cixius, 262
" Clastoptera, 259
" eating gay-beard, 234
" emperor moth, 271
" Euderces, 236
" Hylastes, 248
" leaf Chermes, 267
" " scale insect, 268
" Sphinx, 270
" timber beetle, 246
Pini, Cixius, 262
" *Clastoptera*, 259
" *Euderces*, 236
" *Tomicus*, 244
Pinicola, Anomala, 281
Pinicorticis, Coccus, 254
Pinifex, Hylastes, 248
Pinifoliæ, Aspidiotus, 268
" *Chermes*, 267
Pinivora, Eupogonius, 234
Pissodes Strobi, 255
Pitch-eating weevil, 251
pithecium, Limacodes, 85
Planosa Laricis, 287
" *Velleda*, 31
Plant-lice, (see Aphis)
Platygaster Lecanii, 308
Plume, Gartered, 127
Plum leaf Aphis, 68
" Sphinx, 65
" weevil, 70
Pæciloptera pruinosa, 148
Polistiformis, Trochilium, 95
Polyphemus, Hyalophora, 181

Section.
Polyphemus moth, 181
Pomonella, Carpocapsa, 48
Pometellus, Chætochilus, 42
Poplar borer, 349
" gall-lice, 353-356
Popularia, Pemphigus, 354
Populicaulis, Pemphigus, 353
Porter Hylotrupes, 238
Prickly Leptostylus, 4
Prionus, Broad necked, 348
" Harris's, 240
" Pennsylvania, 234, 348
Prionus laticollis, 348
Procris Americana, 121
Progne butterfly, 142
Progne, Vanessa, 142
Promethea, Attacus, 80
Promethea emperor moth, 80
Prunifoliæ, Aphis, 68
Psenocerus supernotatus, 134
Pseudacaciæ, Cecidomyia, 331
Pseudacaciella, Argyromiges, 335
Psylla, Pear tree, 55
Psylla Pyri, 55
Pteromalus onerati, 313
" *Querci-pilulæ*, 319
pubescens, Attelabus, 208
punctata, Hyphantria, 90
" *Pelidnota*, 130
punctulata, Dicerca, 228
Punctulated Buprestis, 228
punctulatus, Œcanthus, 133
Puppet, Painted, 88
Purblind snapping beetle, 10
" Sphinx, 79
putator, Elaphidion, 305
Pyri, Lecanium, 53
" *Pemphigus*, 1
" *Psylla*, 55
" *Scolytus*, 5, 56
" *Trochilium*, 52
Pyrivora, Cantharis, 58

quadripilis, Oribata, 159
quadrivittata, Tettigonia, 173
Querci, Eriosoma, 306
" *Leiopus*, 304
Querci-albella, Argyromiges, 328
Quercifex, Lecanium, 307
Quercifoliana, Argyrolepia, 326
Quercifoliella, Argyromiges, 327
Querci-lanæ, Spalangia, 316
Querci-onerati, Macroglenes, 313
Querciperda, Cossus, 294
Querci-pilulæ, Pteromalus, 319
Querci-pisi, Macroglenes, 319
Quercitron bark-borer, 303
" scale insect, 308
Quercitronis, Lecanium, 308
Quercus-arbos, Cynips, 310
" *-batatus, Cynips*, 311
" *-ficus, Cynips*, 314
" *-globulus, Callaspidia*, 312
" *-lana, Cynips*, 316
" *-pisum, Cynips*, 319
" *-tuber, Cynips*, 309

rectus, Balaninus, 209
Red-humped prominent, 37
" -shouldered Apate, 158
Regal hickory moth, 182
regalis, Ceratocampa, 182
Rhagium lineatum, 241

INDEX.

Section.
Rhagium, Ribbed, 241
Rhaphigaster Pennsylvanicus, 99
Ribbed Rhagium, 241
Ribearia, Abraxas, 141
Ribis, Aphis, 145
" *Lecanium,* 140
" *Tyroglyphus,* 137
Robertsonii, Anotia, 113
" *Naso,* 115
Robiniæ, Cecidomyia, 332
" *Clytus,* 329
" *Cossus,* 293
" *Microgaster,* 334
Robiniella, Anacampsis, 334
Rosacean Tortrix, 46
Rosaceana, Lozotænia, 46
Rose bug, 50
rosea, Uroplata, 47
Rosy Hispa, 47
Rough Osmoderma, 7
Sable, Spotted-winged, 126
Sad tree-hopper, 203
Saddled leaf-hopper, 69
Saperda, Banded, 154
" Discoidal, 153
" Lateral, 342
" Trident, 341
Saperda bivittata, 2
" *calcarata,* 349
" *discoidea,* 153
" *lateralis,* 342
" *tridentata,* 341
Saratoga spittle-insect, 258
Saratogensis, Aphrophora, 258
Satellite Sphinx, 119
Satellitia, Philampelus, 119
Saturnia Io, 81, 329
Saw-fly, Abbot's, 275
" American, 274
" Black-calfed, 94
" Fabricius', 276
" Fir tree, 283
" Le Conte's, 273
" Partner, 277
Saw-necked Valgus, 217
Sayii, Apion, 339
Say's weevil, 329
scabra, Osmoderma, 7
scalaris, Chrysomela, 345
Scale insect, Butternut, 189
" Cherry, 75
" Cotton, 16
" Oak, 307
" parasite, 308
" Pine-leaf, 268
" Quercitron oak, 308
" Vine, 96
Scolytus Pyri, 5, 56
Scurfy bark-louse, 54
scutellaris, Anopletis, 333
scutellatus, Monohammus, 232
Selandria Cerasi, 92
" *Juglandis,* 194
semirubrum, Acrydium, 215
Senatorial Dryocampa, 322
septemdecim, Cicada, 14
septentrionis, Arrhenodes, 295
sericeum, Lymexylon, 297
serricollis, Valgus, 217
seticollis, Valgus, 216
Seventeen-year locust, 14
sex-fasciatus, Dryobius, 343
sex-notata, Metachroma, 285

Section.
siccifolia, Geometra, 86
Signoretii, Aphrophora, 98
" *Otiocerus,* 109
Signoret's spittle-insect, 98
Single white-spot, 325
Single-striped tree-hopper, 102
Silky timber-beetle, 297
Silvanus bidentatus, 195
Silvanus, Two-toothed, 195
silvatica, Clisiocampa, 321
Six-banded Dryobius, 343
Six-spotted Metachroma, 285
skipper, Tityrus, 330
Slender locust leaf-miner, 335
Slug-worm, Cherry, 92
Slender-footed Dysphaga, 155
Smaller leaf-hopper, 359
Smerinthus excæcatus, 35
" *Juglandis,* 186
" *myops,* 79
Smilia Castaneæ, 197
" *inermis,* 64
" *inornata,* 148
" *vau,* 176
Smoky-winged gay-louse, 170
Smooth Osmoderma, 8
Snapping-beetle, Big-eyed, 9
" Blinking, 11
" Purblind, 10
Snow-born Boreus, 291
Snow-fly, Thick-legged, 291
Spalangia Querci-lanæ, 316
Spangled tree-bug, 25
spangles, Oak, 320
Sphinx, Achemon, 120
" Apple, 34
" Black-walnut, 186
" Blind-eyed, 35
" Pine, 270
" Plum, 65
" Purblind, 79
" Satellite, 119
Sphinx coniferarum, 270
" *drupiferarum,* 65
" *Gordius,* 34
Spilonota oculana, 45
Spilosoma Virginica, 125
Spined tree-bug, 26
spinosa, Arma, 26
Spittle-insect, Four-spotted, 97
" Parallel, 257
" Saratoga, 258
" Signoret's, 98
Spotted ermine moth, 91
" horn-bug, 72
" Leptostylus, 187
" Pelidnota, 130
" -winged Buprestis, 225
" " Diraphia, 266
" " Dryocampa, 323
" " gay-louse, 169
" " sable, 126
Spruce-tree leaf-hopper, 282
stigma, Dryocampa, 323
Straight-beaked nut-weevil, 209
Striped flower-cricket, 132
Strobi, Bythoscopus, 261
" *Pissodes,* 255
Strobus, Lachnus, 256
subspinosus, Macrodactylus, 50
subvittata, Dichelonycha, 207
supernotatus, Psenocerus, 134
suratus, Nematus, 94

INDEX.

Section.
suturalis, Hispa, 333
Sword-tail, Walnut 174
Syneta tripla, 357

taurina, Ceresa. 23
Tawny-striped Palmer worm, 43
Telamona Coryli, 202
" *fasciata,* 176
" *tristis,* 203
" *unicolor,* 175
tenuipes, Dysphaga, 155
terebrans, Hylurgus, 247
Termes frontalis, 196
testacea, Clastoptera, 260
Testaceous Clastoptera, 260
Tettigonia quadrivittata, 173
textor, Hyphantria, 88
Thecla Niphon, 272
Thelia bimaculata, 340
" *Cratægi,* 21
" *univittata,* 102
Thick-legged snow-fly, 291
Thorn-bush tree-hopper, 21
Thorny oak-worm, 323
Three-banded leaf-hopper, 105
Three-colored Lithosia, 213
Thrips, Apple, 51
" Hickory, 165
Thunderbolt, 300
Tiger Cerambyx, 151
tigrina, Goes, 151
Tiliaria, Erannis, 39
Timber beetle, American, 298
" Silky, 297
Tingis, Butternut, 193
Tingis Juglandis, 193
Tipuliforme, Trochilium, 135
Tityrus skipper, 330
Tityus, Dynastes, 72
Tooth-legged Buprestis, 302
Tomicus liminaris, 60
" *Mali,* 5
" *materiarius,* 246
" *Pini,* 244
" *pusillus,* 245
" *xylographus,* 242
Tortrix, Apple, 40
" Cherry-eating, 87
" Oak leaf, 326
" Peach, 62
" Rosacean, 46
Trachypteris fulvoguttata, 227
Tragosoma Harrisii, 240
Tree-bug, Large, 24
" Spangled, 25
" Spined, 26
Tree-hopper, Banded, 176
" Black backed, 103
" Buffalo, 22, 340
" Butternut, 191
" Calf, 23
" Chestnut, 197
" Hazelnut, 202
" One-colored, 175
" Sad, 203
" Short-horned, 177
" Single striped, 102
" Thorn-bush, 21
" Two-marked, 190
" Two-spotted, 340
" Unadorned, 198
" Unarmed, 64
" V-marked, 176

Section.
Tremex Columba, 52
Tremex, Pigeon, 52
Trichetra opercularis, 67
tricincta, Erythroneura, 105
tricolor, Atolmis, 213
Trident Saperda, 341
tripla, Syneta, 357
Triple-rowed Crioceris, 357
Triple white-spot, 325
triplipunctata, Amilapis, 325
tristis, Telamona, 203
Trochilium caudatum, 136
" *exitiosum,* 59
" *Polistiformis,* 95
" *Pyri,* 52
" *Tipuliforme,* 135
tuberculata, Dicerca, 220
Tuberculated Buprestis, 220
Turnus, Papilio, 36
Two-marked tree-hopper, 190
" -spotted tree-hopper, 340
" -toothed Silvanus, 195
Tyroglyphus Ribis, 137

Uhlerella, Argyromiges, 337
Uhler's leaf-miner, 337
Ulmicola, Byrsocrypta, 347
Ultramarine Buprestis, 224
Unadorned tree-hopper, 198
Unarmed tree-hopper, 64
unicolor, Telamona, 175
unio, Eudryas, 129
unipunctata, Amilapis, 325
univittata, Thelia, 102
Unstable drab moth, 41
Urocerus, 252, 253
Urocerus, White-horned, 252
" Yellow-banded, 253
Uroplata pallida, 194
" *rosea,* 47
Uroxiphus Caryæ, 174

V-marked Clostera, 352
" measure worm, 39
" tree-hopper, 176
valga, Chionea, 291
Valgus, Bristly-necked, 216
Valgus seticollis, 216
Vanessa C-album, 143
" *Lintnerii,* 211
" *Progne,* 142
Vaporer moth, 32
Variable leaf-hopper, 358
vau, Clostera, 352
Velleda lappet moth, 31
Velleda, Planosa, 31
vernata, Anisopteryx, 38
Vine Aphis, 116
" dresser, 118
" leaf-hoppers, 104-107
" scale insect, 96
violacea, Crepidodera, 77
Violaceous flea-beetle, 77
Virginia Buprestis, 218
Virginica, Spilosoma, 125
Virginiensis, Chalcophora, 218
Vitifex, Erythroneura, 106
Vitifoliæ, Pemphigus, 117
Vitis, Aphis, 116
" *Erythroneura,* 104
" *Lecanium,* 96
vulnerata, Erythroneura, 107

Section.
Walnut ant, ... 157
" sword-tail, ... 174
Waved tussock moth, ... 67
Web-worm, Fall, ... 88
Weevil, Gray-sided, ... 296
" Long beaked, ... 185
" New-York, ... 13
" Pales, ... 250
" Pitch-eating, ... 251
" Plum, ... 52
" Say's, ... 339
" Straight beaked, ... 204
" White pine, ... 255
Westwoodii, Anotia, ... 111
White flower-cricket, ... 131
" miller, ... 125
" oak leaf-miner, ... 328
" pine Aphis, ... 256
" " leaf-hopper, ... 261
" " weevil, ... 255
" -C butterfly, ... 143
" -horned Urocerus, ... 252
" -necked Pine beetle, ... 280
" -S Clostera, ... 350
" -scutelled Pine-borer, ... 232

Section.
" -spot measure worm, ... 325
Wild-currant borer, ... 136
Windowed leaf-hopper, ... 360
Witherer, Hickory leaf, ... 166
Wood-engraver bark-beetle, ... 242
" -nymph, Beautiful, ... 123
" " Pearl, ... 124
Wool-sower gall-fly, ... 315
" -tuft parasite, ... 316
Wooly-worm, Butternut, ... 194
Worm, Apple-tree, ... 29
" Canker, ... 24, 38
" Oak, ... 322-324
" Palmer, ... 42-44
Wounded leaf-hopper, ... 107

xylographus, Tomicus, ... 242

Yellow locust-midge, ... 332
" -dotted Buprestis, ... 227
" -necked Apple worm, ... 29
" " ermine moth, ... 89
" " gall-fly, ... 291
" -striped oak-worm, ... 322